



Annual Report

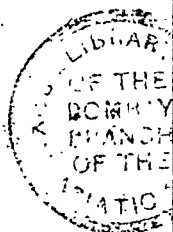
of the

Department of Agriculture in the Bombay Presidency

For the Year 1932-33.

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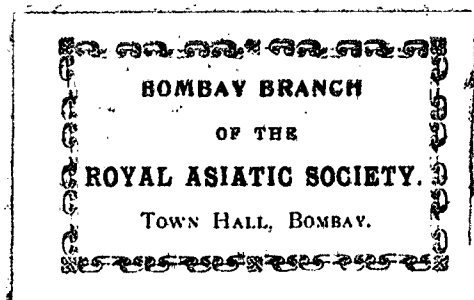
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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PRESIDENCY, 1932-33

CHAPTER I.

FEATURES OF THE YEAR.

The year 1932-33 was, from the agricultural standpoint, fairly satisfactory, being a little better than its predecessor. There was a slight diminution in the acreage under food-grain crops owing to the unstitutability of sowing rains in some places. Later weather conditions, however, were favourable and there was an absence of adverse influences such as the wheat rust and harmful winds of the preceding year. The resulting fairly good yield made up for the contraction in area cultivated. The following tabular statement compares the actual acreage sown and the estimated tonnage of the food-grain crops produced, in the years 1931-32 and 1932-33 :—

Division	Area in thousands of acres		Estimated outturn in thousands of tons	
	1931-32	1932-33	1931-32	1932-33
	Acres	Acres	Tons	Tons
Gujarat	2,663	2,342	832	704
Deccan	11,129	11,052	2,007	2,077
Karnatak	4,668	4,702	899	955
Konkan	1,598	1,606	661	651
Total, Bombay Presidency ..	20,058	19,702	4,399	4,387

The figures of the total cropped area for the year under review do not reveal any marked departure from the position prevailing during the preceding two or three years, as will be gathered from the following tabular statement :—

Year	Area in thousands of acres sown with different crops in the Bombay Presidency proper			
	Food-grain crops (cereals and pulses)	Cotton	Groundnuts	All crops
	Acres	Acres	Acres	Acres
1929-30	19,048	4,484	1,068	28,718
1930-31	20,502	3,550	999	29,133
1931-32	20,059	4,065	989	29,372
1932-33	19,744	3,879	1,195	29,155

The decrease noticed in the cotton area as compared with the previous year was counterbalanced by the good yield which was about 7 per cent. better than that secured during the previous year.

Although the slump conditions which commenced in May 1930 were still with us they were tempered with hope, which was reflected in an improvement in prices of both food-crops and export crops at important centres in the Presidency. This is shown in the following statement :—

Prices prevailing at harvest time for agricultural produce in seers of 80 tolas per rupee except of cotton which are recorded in rupees per khandi of 784 lbs.

Year	Food-crops			Export crops		
	Jowar (Sholapur)	Bajri (Nasik)	Rice (Thana)	Wheat (Ahmed- abad)	Broach Cotton (Bombay)	Ground- nuts (Karad)
	Seers	Seers	Seers	Seers	Rs.	Seers
1929-30 ..	10	7	6	7	257	8
1930-31 ..	22	9	8	12	197	17
1931-32 ..	23	16	9	12	194	15
1932-33 ..	21	12	9	9	199	10

It will be seen that although the prices during the year were considerably lower than those prevailing in 1929-30 they showed a definite upward trend when compared with those ruling during the last two years.

Cotton prices were, as usual, very sensitive to world influences. Such influences were the first and second official estimates of the American cotton crop in August and September 1932, the alteration in the monetary policy of the United States of America in April 1933, and the threatened Japanese boycott of Indian cotton, this being the result of the twice enhanced Indian duty on foreign cotton goods.

The actual fluctuations in cotton prices will be seen from the following statement which gives the prices in rupees per khandi of Broach F.G. Cotton at Bombay during the year under report :—

1932	Rs.	1933	Rs.
July	186	January	207
August	220	February	190
September	234	March	185
October	211	April	180
November	209	May	203
December	198	June	214
		July	215

An event of great importance to India was the Ottawa Conference held in July-August 1932 for the promotion of trade within the Empire. The effect of this has been to give India a preference in the United Kingdom markets for several of her

products and the result is already visible in the increased sales of Indian linseed in Britain. It is now more than ever necessary that India should look to the quality of all products exported to Britain, especially groundnuts, castor seed and fibres.

There is renewed interest in the possibility of increasing the export of cotton-seed from India to Britain. This export, of which about 95 per cent. goes through the port of Bombay, was in the year immediately before the war about 285,000 tons. The war caused an immediate drop and the export was only about 14,000 tons in 1918-19. But in the following year it soared again to 250,000 tons. Since then there has been a falling off until 1930-31 after which it has come down as low as about 12,000 tons in 1931-32. This slump is partly connected with the very great reduction of prices of cotton-seed in London, since it apparently does not pay Indian shippers to export cotton-seed on such terms, and is also due to the competition of Egyptian cotton-seed which has the advantages of being produced nearer to Great Britain and of having seeds that are without the fuzz (short hairs) with which much Indian cotton-seed is covered. Should cotton-seed prices improve there is some possibility of the export business beginning to recover. It is worth noting that in the year 1931 cotton-seed had become so cheap in some parts of India that it was being burnt in the furnaces of ginning factories.

Another event which might have influenced India was the World Economic Conference which assembled in London in 1923 with the object of reviving world trade. The hopes entertained in this conference were not, however, fulfilled and it was held up on account of disagreements regarding monetary policy. It becomes more and more clear even to a layman that until some sensible agreement is reached regarding money as a medium for facilitating the exchange of raw material and manufactured products it will be difficult to get out of the present confusion.

Coming to affairs in India itself, the rapid development of Indian sugar, manufactured under the protection of the present enhanced tariff, continued. According to the Sugar Technologist to the Imperial Council of Agricultural Research the number of sugar factories in the year under report increased by 27, making a total of 70. There are 58 factories under construction during 1933, which are expected to work during the season 1933-34. The total number of factories in India expected to work during the season 1933-34 will therefore be 128 as against 43 in 1931-32 an increase of 200 per cent. in two years. The total estimated consumption of sugar in India in

1932-33 was 9,28,095 tons and the estimated total production of sugar in India in the same year was 6,26,000 tons, the latter figure including sugar from up-to-date factories, gur refineries and from the Khandsari system. The estimated production of cane factory-sugar alone was 2,60,000 tons while that of the gur refineries was 91,000 tons. In the Bombay Presidency itself there are the following new sugar factories under construction :—

- (1) The Saswad Mali Sugar Factory Ltd. at Akluj on the Nira Right Bank Canal; capacity about 250 tons cane per day.
- (2) The Phaltan Sugar Factory at Pimpalwadi in the Phaltan State, on the Nira Right Bank Canal; capacity about 400 tons cane per day.
- (3) Factory of Messrs. Marsland Price & Co. Ltd. at Kalam on the Nira Left Bank Canal; capacity about 150 to 200 tons cane per day.
- (4) The Maharashtra Sugar Mills Ltd. at Belwandi on the Visapur Canal; capacity about 150 to 200 tons cane per day.
- (5) The Rawalgaon Sugar Farm's Factory at Rawalgaon on the Girna Canal of the Nasik District; capacity about 150 tons cane per day.
- (6) The Kolhapur Sugar Mills Ltd. at Kolhapur; capacity about 350 tons cane per day.

At an informal round table conference held by Government on June 2 and 3, 1933, at Poona, to discuss some outstanding questions connected with the co-operative movement in the Bombay Presidency, it was considered that to relieve the financial condition of agriculturists in the Deccan Canal Areas centrifugal sugar-making plants should be erected by the Provincial Bank and by Government, care being taken that the locations were wisely selected both in respect of area under cane and the possible market and that there should be no undue competition between such small factories and large factories likely to be erected in the area. Following this up, Government are arranging to erect such a centrifugal plant at Hol on the Nira Left Bank Canal and the Bombay Provincial Co-operative Bank are arranging to do similarly at Nira Wagaj. It is hoped that these will shortly be complete. Continued success of manufacture of sugar in India depends on the maintenance of good prices for sugar. There is no doubt that with prices as they are at present manufacturers are making a handsome profit, although there is considerable doubt as to whether this is being passed on in a just proportion to the

cane-grower. This doubt is enhanced by the fact that prices paid per maund for cane in certain parts of the United Provinces which were expected to continue at about 5 to 6 annas are reported to have fallen to 4 and even $3\frac{1}{2}$ annas. The influences likely to affect sugar prices in India in the near future are (1) the increasing production of sugar in India which may result in a reduction of the selling price due to internal competition and (2) the fact that the big selling agency for Java sugar has recently declared a considerable reduction in its selling prices and an additional reduction for Western India. In the year under report the average price realized by the United Provinces factories was Rs. 9-5-0 per maund of sugar. It is understood that railway freight on sugar from Cawnpore to Bombay is now reduced to annas 14 per maund as against the old rate of Rs. 1-8-6 per maund. Such reductions have been made by the railway companies in order to get business to make up for the reduced traffic in imported sugar. It is not unlikely that if entire steamers can be chartered, cheaper freight by sea from one port in India to another may also be achieved in the near future. Freight reductions by land and sea may constitute a challenge to factories established or being established in the Deccan. The world sugar situation should also be kept in mind. Sugar prices in the past few years had slumped to unprofitable levels and the main sugar-growing countries had come to an agreement limiting production and attempting to improve prices. The position of India with regard to this international body appears to be rather obscure. Press reports seem to indicate that India is not yet in line with other sugar-producing countries on the subject of control of either quantity or price. More recently the United States of America and its neighbouring sugar-producing countries have under President Roosevelt's guidance come to an agreement regarding their own relative production and prices. There is a world attempt to control the situation and it would be a pity if India were at the present stage to permit the price either within India, or in the world generally, again to deteriorate.

In the Bombay Presidency the year was marked by a series of useful conferences held at the instance of His Excellency the Governor to deal with a variety of subjects. The special conference to consider the co-operative movement has already been mentioned. Two others of importance to agriculture were a conference to consider the improvement of transport of fish and fruit within the Presidency and a conference to consider the development of the export of Indian fruit overseas.

Railway and coastal shipping authorities showed themselves very willing to consider any concrete proposals for the development of fish and fruit transport in the Presidency. As to overseas export, it is the opinion of the Director of Agriculture that the formation of a strong organization of fruit-growers in Bombay able and willing to control both quality and quantity of export fruit is the first desideratum. The provision of cold storage for limited quantities of fruit direct from Bombay to England at regular intervals presents a great difficulty at present, but if the first necessity of a strong local organization is provided, the other difficulties can be dealt with one by one. The subject of rural reconstruction was also brought conspicuously to the front in a movement initiated by His Excellency the Governor and likely to have far-reaching effects.

Finally, reference must be made to the report of the Reorganization Committee of the Government of Bombay (generally known as the Thomas Committee) which was published during the year and on which Government have taken a considerable amount of action. The Thomas Committee reported adversely on the College of Agriculture, but a reconsideration of the facts led Government to continue this excellent institution with the proviso that the cost of running it should be reduced and the fees enhanced. It is worth while giving in one statement the retrenchment carried out in the Bombay Department of Agriculture during the last three years (1930-31 to 1932-33).

STATEMENT I.

	Rs.
Total departmental budget in 1929-30 ..	15,81,950
Total departmental budget in 1933-34 ..	11,24,900
Difference ..	4,57,050

STATEMENT II.

Showing the number of permanent posts retrenched in this Department of (1) Gazetted rank, (2) Non-gazetted and Subordinate ranks, (3) Other posts and (4) Total number of posts.

Number of posts of the Gazetted rank	Number of posts of Non-gazetted and Subordinate ranks	Number of other posts	Total number of posts	Remarks
4	65	26	95*	

* This is exclusive of the temporary establishment for Boring operations.

CHAPTER II.

AGRICULTURAL SERVICE AND PROPAGANDA.

In the present report agricultural service and propaganda are included in one chapter, since these two subjects are inextricably linked. For example, the provision of good seed inevitably involves propaganda to get people to use it and the application of sulphur dust against diseases is often made the occasion of a demonstration of the efficacy of the remedy.

It is not proposed to deal exhaustively with every possible subject under this heading, but to select one or two activities for special mention.

It may be noted in passing that the personnel for agricultural service and propaganda requires to be increased in order to be anything like adequate to the demands made upon it and to the territory it has to cover. The cultivated area in the Bombay Presidency is 33,607,000 acres. To cover this area the Agricultural Department has on the propaganda side the following staff :—

Graduate assistants	..	..	41
Non-graduate assistants	..	..	28
Kamgars	..	..	31
			100

i.e., taking everyone of all grades together there is an area of 336,070 acres to each worker. These figures are given merely to indicate that, the moment opportunity offers, it is essential to increase the personnel on the propaganda side of the Agricultural Department.

SEED SUPPLY.

The supply of good seed is an activity specially suitable for combined Government and public action. The term "good seed" does not simply mean seed which has a good germinating capacity, but means pedigree seed i.e. seed from varieties produced by means of selection or hybridization by the plant-breeding staff and definitely superior both in yield and quality to the local varieties which this seed replaces. A seed supply requires three stages before it reaches the public. The first is a small plot under the immediate charge of a plant-breeder. In this plot he arranges that all plants shall be self-fertilized so

that there is no crossing with outside plants. This pure-bred seed is the foundation for all further multiplication. The second stage is when this self-fertilized seed is grown on a larger scale on a Government farm where it is also self-fertilized or is kept free from contamination by other varieties. The third stage is when the second-stage seed is distributed to registered seed-growers in the district who guarantee to grow this seed according to instructions and to permit the officers of the Agricultural Department to "rogue" the fields (i.e. to remove all plants that are not true to type). Such growers undertake to provide the department with the whole or a portion of the seed on fixed terms. Generally it is necessary to repeat twice or even thrice the second and the third stages before the seed finally goes out to the public. The system ensures a perpetual renewal of the seed supply by the plant breeder at his end and a perpetual giving out of multiplied pure seed to the public at the other end. On this model all seed schemes are now based.

The following are short accounts of the main seed supply schemes as carried on during the year :—

The Hubli Jayawant Cotton-seed Scheme.—This has been explained in detail in the Annual Report of 1931-32. The following table shows the progress during the year under report :—

Name of variety	Stage	Quantity of seed distributed in 1932-33 in lbs.	Area in acres	Quantity of produce obtained in dokras*	Approximate quantity of seed purchased for distribution in 1933-34 in lbs.	Quantity of seed to be purchased in lbs.	Total quantity of seed to be stocked for 1933-34 in lbs.
1	2	3	4	5	6	7	8
Jayawant	II	..	..	38	10,014	986	11,000
	III	13,027	1,117	472	109,340	50,660	160,000
	IV	145,408	13,902	2,904	652,320	217,080	1,339,800
	V	667,606	53,481	430	120,400		
	Old stock	..	..	..	350,000	..	..
		828,041	68,500	3,844	1,242,074	268,726	1,510,800

In this scheme, stage II is the multiplication on the Dharwar farm, stages III and IV are two steps in the multiplication by growers.

* Dokra = 336 lbs.

Gadag Cotton-seed Scheme.—The following table shows the progress during the year:—

Name of variety	Stage	Quantity of seed distributed in 1932-33 in lbs.	Area in acres	Quantity of produce obtained in dokras	Approximate quantity of seed purchased for distribution in 1933-34 in lbs.	Quantity of seed to be purchased in lbs.	Total quantity of seed to be stocked for 1933-34 in lbs.
1	2	3	4	5	6	7	8
Gadag I	II	..	20	7	1,595	5	1,600
	III	4,140	475	103	24,274	..	20,000
	IV	11,484	1,181	391	89,034	106,692	200,000
	V	214,919	2,043	1,963	461,634	7,666	973,400
	VI	541,057	31,970	40	9,100		
	Old stock	..	..	..	500,000	..	..

In this, stage II is the multiplication on the Government farm and stages III, IV and V are three steps in multiplication by seed-growers. In both the Hubli and Gadag schemes the crop in the seed-growers' fields was inspected and rogued. The expenses of roguing were from 4.4 to 4.86 pies per acre. The produce was collected and ginned separately and the seed obtained has been stocked for distribution during the coming season. These schemes are helped by grants from the Indian Central Cotton Committee. Proposals have been made for a revision of the methods by which the Indian Central Cotton Committee finances these schemes and the said proposals are now being considered by the Indian Central Cotton Committee.

Athani Cotton-seed Scheme.—A new seed multiplication scheme on similar lines has been started at Athani during the year, also with the aid of the Indian Central Cotton Committee. A reserved area of 1,000 acres has been organized at Kagwad.

Khandesh Banilla Cotton-seed Scheme.—This scheme was also explained last year. It has now completed its second year. Stage I continues to be grown on the Dhulia farm on 6 acres and 22 gunthas.

Stage II—Multiplication of pure seed.—The site for this has been shifted during the year from Patonda to Bhadgaon where an area of 208 acres has been rented for four years. The area was tractor-ploughed. The quantity of seed obtained was 15,860 lbs. which will be sown at Bharwas for stage III.

Stage III—Multiplication of seed from stage II in cultivated fields.—During the year an area of 1,012 acres was organized in the village of Bharwas in the Amalner taluka where 27,170 lbs. of seed were distributed. From the purified crop of this stage 140,920 lbs. of seed were obtained.

Stage IV (also multiplication) was on an area of 3,451 acres in five centres viz., Amalner, Shirpur, Erandol, Pachora and Chalisgaon. In this stage 101,767 lbs. of seed were distributed, and the seed obtained was 473,200 lbs.

Next year the general distribution of seed in the district will commence. After the requirements of stage IV have been met, about 364,000 lbs. of seed will be available for distribution.

Surat Cotton-seed Scheme.—The quantity of seed distributed during the year was about 7 lakhs of lbs. distributed from 20 depots. In addition, nearly 18 lakhs of lbs. were supplied to various States e.g. Rajpipla, Chhota-Udepur, Cambay, Jambughoda and Baroda. The Indian Central Cotton Committee subsidized this scheme to the extent of Rs. 6,745 during the year.

Rice Seed distribution.—In North Thana, seed of improved rice strains sufficient to cover 132 acres was distributed to twenty-five registered seed-growers. The estimated yield from this area was 1,47,000 lbs. sufficient for nearly 3,000 acres in the ensuing season.

In South Thana, seed sufficient to cover about 260 acres was distributed to registered seed-growers. The estimated yield was nearly 3,90,000 lbs. sufficient for 8,000 acres.

In Kolaba district, strain No. 42 is popular, especially in North Kolaba, and during the year 3,430 lbs. of seed of this strain were distributed to registered seed-growers, sufficient to cover 75 acres. The registered seed-growers distributed about 28,000 lbs. of seed to cultivators in the tract.

To increase the area on which pure rices can be multiplied under departmental control, arrangements were made with the Trustees of the Jambul Agricultural School lands and about 7,000 lbs. of different pure strains of rices were distributed from this centre. Similarly, an area of 10 acres of land near Karjat is being used for the similar purpose.

In the Ratnagiri district, during the year 7,000 lbs. of improved rice strains were distributed to registered seed-growers for an area of 150 acres. The expected yield was 2,50,000 lbs. but

the seed was much damaged by rain and only about 40,000 lbs. of seed were finally available for distribution to the general public. This seed is sufficient for about 800 acres.

Nagli seed distribution.—2,000 lbs. of seed of improved strains were supplied to the registered seed growers for an area of 250 acres. Here again rain spoiled the crop and only about 8,000 lbs. of seed were finally available for distribution and is sufficient for 800 acres in the following season.

Wheat seed distribution.—Arrangements are being made to multiply seed of strain No. 168 on the Jalgaon Farm.

OTHER GRAINS.

Without going into details it may be mentioned that in Gujarat the variety of jowar called Budh Perio 53, selected and multiplied by the Department, is being widely distributed, and, in the Deccan, Akola bajri is also being given out to the cultivators in large quantities.

PREMIUM BULLS.

The following table shows the progress in the system of putting out premium bulls during the year.

Zone.	Number of Bulls working on 1st July 1932.	Number of Bulls working on 1st July 1933.
<i>Intensive Breeding Zones.</i>		
1. Chharodi	31	28
2. Surat	9	7
3. Satpura	11	41
4. Sholapur	28	39
5. Belgaum	2	5
6. Bankapur	20	30
<i>The rest of the Presidency.</i>		
7. South Central Division	1	2
8. North Central Division (including 2 in Konkan)	14	9
9. Southern Division	3	4
10. Gujarat	18	20
Total ..	137	185

A very satisfactory beginning has been made in the work of registering pedigree stock, the total number registered during the year in each of the main breeds being as follows :—

Breed.					Number of animals registered.
Khillar	..	..	..	..	72
Gir	..	..	..	..	53
Kankrej	..	..	..	..	150
Krishna Valley	..	..	..	..	22
Amrit Mahal	..	..	..	..	19
Total ..					316

POULTRY.

During the year the number of stud-birds put out were as follows :—

Name of Division.				Number of stud-birds put out in 1931-32.	Number of stud-birds put out in 1932-33.
Northern Division (including suburbs)	..	..	Bombay	21	2
North Central Division	..	..	..	3	8
South Central Division	..	..	..	16	62
Southern Division	..	..	..	1	3
Sind	..	..	..	4	..
Indian States	..	..	..	3	20
Total ..				48	95

THE GUJARAT BOLL-WORM CLEAN-UP SCHEME.

In the year under report there was carried out what is perhaps the biggest piece of agricultural propaganda that has ever been attempted in the Bombay Presidency. This scheme was financed by the Indian Central Cotton Committee. The object thereof was to remove, before 5th May, every single cotton stump on an area of over 80,000 acres. This work is the practical outcome of research on the cotton boll-worm which was done in Surat, also financed by the Indian Central Cotton Committee. It has been proved that this pest is carried over from one crop to another by being able to live on cotton plants which are left in the soil or from shoots arising from the roots of the cotton plants whose stumps have been cut but whose roots have remained in the soil. The obvious

remedy is to remove all cotton stumps completely, as early as possible, and so leave a period, during the hot weather, of at least six weeks, in which there are no plants for the pest to live on. The easy pulling of cotton stumps is now possible on account of a cheap instrument called the cotton puller which has been gradually evolved by the work of several brains and which is now manufactured on a large scale by the Sayaji Iron Works, Baroda. It costs only Rs. 1-2-0 each to the cultivator. This implement is rather like a magnified nail-puller. In addition to early and easy removal of the stumps, the use of this implement saves about 6 to 8 annas per acre on agricultural operations and makes the preparation of the soil for the next season very much more easy. The staff for this work consisted of the following :—

- (a) One supervising officer (Cotton Entomologist).
- (b) Three graduate assistants.
- (c) Nine supervisors.
- (d) 108 Kamgars.
- (e) One clerk.
- (f) Five peons.

About 200 volunteers from 125 villages were enrolled for carrying on the propaganda. Prizes were offered for early and complete cleaning-up and, in February, under the Chairmanship of the Collector of Broach, these prizes were awarded. These measures are very successful, yet at the end of 15th May, 5,330 acres still remained uncleaned and the staff of the scheme cleaned this remaining area themselves at the expense of the scheme. The effect of this clean-up will be seen in the following year. Propaganda for extending the work over a much wider area is now being taken in hand.

THE USE OF SULPHUR.

In sulphur, nature has provided a remedy which we have found exceedingly useful for a considerable number of plant-diseases. Some of these are jowar-smut, grape-vine mildew, mango-blight and *tambera* disease of potato. The fact that sulphur can be used in powder and not as a spray makes it easy and clean to handle and its comparatively low price puts it within the reach of all cultivators. The use of sulphur should be made one of the items of propaganda in all village work. There is need for very rapid extension of its use particularly in jowar areas. A perusal of the reports of the Deputy Directors contained in the appendices to this main

report will give some idea of the utilization and spread of this remedy.

EXTIRPATION OF PRICKLY-PEAR.

Prickly-pear is not indigenous to India. It belongs to South America and was imported by the East India Company in the middle of the 18th century for the purposes of growing the cochineal insect then used as a red dye. The cochineal insect, if in excessive numbers, will inevitably kill the prickly pear and this method is now being utilized in this Presidency with considerable success. A special variety of cochineal insect whose scientific name is *Dactylopius tomentosus* and which was introduced into India only recently, has been found specially suitable for this work. The annual report of the Deputy Director of Agriculture, S. D., particularly, indicates the success achieved in extirpating prickly-pear by means of cochineal insect. This is work which should be made a part of village propaganda and widely and rapidly extended.

PROTECTION OF CROPS AGAINST WILD ANIMALS.

If there is one thing for which cultivators cry out, it is for means of protecting their crops against wild pig. Although officially the posts of the Shikar Officer and his assistant were retrenched, it has been possible to retain these two men in service for the current year under other heads and their work has been good and exceedingly appreciated. The following is a summary of their campaigns against pig.

(1) *Singhagad Group, Haveli Taluka, Poona District.*—Work continued in co-operation with the District and Taluka Local Boards. 59 pigs were killed. Total expenditure: Rs. 85 on wages, Rs. 41 on ammunition = Rs. 126, i.e. a little over Rs. 2 per pig.

(2) *The Godavari Canals.*—A campaign was organized by moonlight and without dogs in the last three months of 1932 and 36 pigs were killed at a cost of Rs. 100 and 100 cartridges. With the exception of cartridges the cost of the campaign was borne by the people themselves. This work was carried on through a local shikar institution, the Godavari Canals Gun Club.

(3) *The Pravara Canals.*—A campaign was organised in April-May 1933. The work was done during the day by a regular party containing 5 trained gun shikaris, 35 Vaidu beaters and 35 trained dogs. 85 pigs were killed at a cost of Rs. 199-14-0

and 168 cartridges. This works out to Rs. 2-12-6 per pig. Later on the Gun Club ran a campaign for itself with Vaidus and dogs and secured 20 pigs.

(4) *The Palshi group, Koregaon Taluka, Satara District.*—The campaigns of previous years have very much reduced pig trouble. A further campaign will be undertaken next year.

New work in the Southern Division.—On account of the many complaints from the Southern Division, the Director deputed Mr. P. N. Bhide, the Shikar Officer, to see if it was possible to organize a gun club and, after careful investigation, Arvatgi, at the junction of the Kanara and Belgaum Districts, was chosen. A gun club is being organized in that area and a preliminary campaign is being run.

Other work.—There was much work which could not be taken in hand for want of time at two places in the Belgaum district, in Mulshi Petha of the Poona District and at Shiravli on the Nira Left Bank Canal. This shikar work should on no account be stopped but should be increased at the earliest possible moment.

Field rats in Khandesh.—Mr. Bhide toured in West and East Khandesh to study particularly whether the field rats damage crops and have any specially defined breeding areas. It was found that there are three kinds of rats involved and the nature of their burrows and their method of attack on crops have been investigated. Fumigation of their burrows by foot pumps is the best remedy. This also is an item which for village propaganda should be taken up vigorously.

LAND DEVELOPMENT.

Here again the post of the officer especially set aside for this work was retrenched in the Southern Division. Yet it was possible to utilize one post of District Agricultural Officer for this work which has taken a strong hold on the imagination of the people in the Southern Division. During the year 19 schemes for field embankments to cost Rs. 11,560 were prepared, affecting 622 acres. Of these, 7 schemes were recommended for tagavi loans and the rest would be financed by the owners themselves.

In the South Central Division, similar work has been dealt with in a similar manner. About 105 acres of the land of the Mulegaon Bunding Society was surveyed, plans and estimates were prepared and bunds for 43 acres were actually constructed.

A survey of the site for bunding work was also done for the Mendergi Nala Bunding Society whose members had deposited Rs. 1,500 for the work. An area of 10 acres was surveyed and bunds laid for the Tandurwade Bunding Scheme. Four sites at Aitavade in the Satara District were surveyed and schemes prepared and on the Mohol Farm bunding was undertaken and completed.

The work of making field embankments is also an item which should be taken up for village propaganda.

SHOWS.

A so-called "agricultural show" may be of any size from the ambitious Presidency Agricultural Exhibition of 1926 down to a small demonstration arranged at the time of Jamabandi or a gathering of cultivators anywhere. During the year there was a big successful show at Pandharpur, started, in the first instance, by the Village Improvement Committee of Sholapur and largely helped by the Agricultural Department. At Betegaon, in connection with the opening of that area by the Bombay Gowrakshak Mandali there was a show in which the benefits of mixed farming i.e. having crops and agricultural animals together in a modern business farm, were very clearly demonstrated. The annual report of the Deputy Director of Agriculture, South Central Division, indicates the extent to which demonstrations of all kinds are utilized by this Department, and as experience grows, the methods of running these become improved and standardised.

Generally speaking it may be said that we find it best to concentrate on a few important items and that it is essential to train those in charge of the exhibits how and what to demonstrate in the exposition of their subjects. It is also very necessary to have clear simple labels everywhere in vernacular describing the things to be seen.

CHAPTER III.

AGRICULTURAL RESEARCH.

In last year's report a list was given of six new important research schemes and also of five old schemes which had reached completion in the year 1931-32 and which were being written up. This writing-up has now been completed for the Surat cotton physiological research scheme and the Dharwar cotton wilt research scheme. In both cases the work has taken the form of a scientific monograph which will, after being sent to referees, be published by the Imperial Council of Agricultural Research either in the form of one or more articles in the *Journal of Agricultural Science* or as a separate publication. The main points of these two researches have already been mentioned on pages 28 and 29 of last year's reports.

The bajri-breeding research scheme has been carried a stage further by the Crop Botanist to Government, and this work will be continued by him as part of his regular programme.

Part of the results of the mango-blight research scheme were published in 1928 as a memoir entitled "Studies in the shedding of Mango Flowers and Fruits." The rest of the material has been embodied in two papers "The Mango Jassid Hopper and its control" and "Mango Flower Mildew" which will shortly be published.

The work on the scheme for improvement of grazing lands has been embodied in a bulletin entitled "Grassland problems in Western India" which is a comprehensive survey of these problems and a statement of the best known methods of solving them. There is no doubt that this problem of the improvement of grazing lands is one that has so far received comparatively little attention. From all points of view it deserves to be given serious consideration by revenue, forest, engineering and agricultural officers. Throughout the world and particularly in the United States the problem of "land utilization" is receiving considerable attention. By land utilization is meant the putting of land to the purposes for which it is best suited. For example, there are in this Province certain waste lands which will grow very poor trees but will grow excellent grass; there are certain lands which will grow very poor crops but excellent grass. In both cases the utilization of these lands for grass will be far more profitable from every point of view than to attempt to grow trees or crops. Along with the problem of utilization goes also the important problem of the prevention of erosion. Throughout India and very noticeably in the Bombay Deccan the first rains every

year bring down enormous quantities of soil (This may amount to as much as 27 tons per acre on unploughed land) which finds its way into the nallas, then the rivers and finally to the sea. If one lives long enough in any one place in the Deccan it is possible to observe in the course of, say, twenty years, the gradual removal of all the surface soil and the exposure of the bare rock on any sloping surface in the Deccan trap area. Embankments have proved to be of the greatest use in preventing such wash in arable lands and it is equally important to put up embankments however small, and however crude, at suitable places throughout all grazing lands in order to prevent the inevitable loss of surface-soil, and the final destruction of all vegetation. Such embankments can be made during the hot weather by local labour and merely by piling up stones found on the area. These embankments may be as small as six inches high in the upper parts of small nallas and may have to be six feet high lower down. But what is mainly intended is that along the contour lines of a grazing area, wherever there is the faintest indication of erosion, lines of stones should be gathered and placed to prevent the first stages of this denudation. After the first rains there is a lot of soil banked up behind these rows of stones. During the monsoon a rich growth of grass develops on this new soil and in two years this land is established. It is then necessary to extend and continue the work by putting lines of stones in new places and by directing the more vigorous flows of water into existing deep channels. Work of this type transforms the side of a hill in about ten years and if combined with rotational grazing (i.e., grazing one block of a land at a time with a limited number of cattle and then giving that block a rest), the improvement in grass is amazing. At the same time there is a definite increase in yield and an upward trend in the quality of the vegetation.

We now come to the research schemes that are actually in being.

(1) *The Sugarcane Research Scheme for the Bombay Deccan*, situated at Padegaon on the Nira Left Bank Canal.—It is financed by the Imperial Council of Agricultural Research for a period of 5 years from 6th June 1932 at a total estimated cost of Rs. 5,22,088. During the year the land has been completely laid out and the laboratory fittings have been completed with the exception of an electrical installation which will shortly be put in.

The staff of the soil physics section have laid out several series of experiments both in the field and in pots in order to

determine the effect of different amounts of irrigation and different kinds and quantities of manures on the soil. The effects of different treatments and of different crop rotations are also being investigated. A survey is also being made in the canal areas to study the long-continued effect of irrigation, manuring, cropping and other agricultural operations, and a survey of the method in which soil is formed and the results of such formation (now called a genetic soil survey) has been taken in hand.

The staff of the crop physiology section have undertaken a study of the effects of climate, water and manure from the standpoint of their effects on the sugarcane plant itself and have also undertaken a study of the relationship of water to manure. All this work is planned in order to answer questions of fundamental importance to the sugarcane-grower.

In the agricultural management section, after the necessary levelling, drainage, lay-out of main and subsidiary water channels and manuring with sann-hemp, experiments have been laid out to test different sugarcane varieties and to study, from the practical farming point of view, the effect of different manurial combinations including both basic manures and top-dressings. The work is now in full swing.

(2) *The Dry-Farming Research Scheme for the Bombay Deccan* is financed by the Imperial Council of Agricultural Research for a period of 5 years from 1st October 1933 at a total estimated cost of Rs. 2,35,000. A site for the main research station has been chosen about four miles from Sholapur on the Sholapur-Hyderabad road and the construction of buildings, including a laboratory, has been taken in hand. A site for a sub-station has been chosen about 5 miles from Bijapur and similar work has been started there. It is hoped to begin the cultivation work in October 1933. The work at these two stations is to be co-ordinated with similar work financed by the Imperial Council of Agricultural Research under the Director of Agriculture, Madras, and the Director of Agriculture, Hyderabad State. A conference of research workers concerned and the Agricultural Expert to the Imperial Council of Agricultural Research, the Director of Agriculture, Bombay, and the Director of Agriculture, Hyderabad State, was held to secure such co-ordination. This research sets out to solve a practical problem which might be stated in the following words: "How are we to grow successful crops in areas of precarious rainfall?"

This involves a study of the plant and its environments (not only the soil and its water-content, but also the air

surrounding the plant as to its effects on the removal of water on the plant.) The water requirements of the plant therefore and how these are met will form the pivot of this work. A study of the soil will indicate how the water is to be held and retained therein and a study of atmospheric conditions will show whether sufficient water is yielded up to the plant by the soil and whether the plant can stand up to hot dry winds. There will be a comparison of a standard set of crop varieties grown in different centres. In the Bombay Presidency the important crop in the areas worked in is *rabi jowar*. A study of implements, old and new, which can be adapted for the special soil treatment required will also be taken up. This work which is now being started ought to give the most valuable results for all the precarious districts of the Presidency.

(3) *The Cold Storage Research Scheme* is financed by the Imperial Council of Agricultural Research for a period of 3 years from 1st March 1934 at a total estimated cost of Rs. 71,610. It was hoped that this work would start early in 1933 but due to a variety of unforeseen causes it was impossible to do so and hence the scheme will come into effective operation from 1st March 1934. The year under report has been used for ordering the cold storage plant itself and for planning the reconstruction of part of the buildings at the Ganeshkhind Botanical Gardens to accommodate the seven refrigerating chambers of the scheme. The staff for the scheme is also being got together. The main objects of this scheme have already been mentioned on page 28 of the last year's report.

(4) *Mango export*.—Closely connected with the above are the experimental shipments of small quantities of mangoes in the purser's cool room on certain P. & O. liners in order to find out the condition in which the fruits arrive at the other end and the possibilities of their sale. In the year 1931-32 a considerable number of consignments were sent and the work so done has been reported by the Horticulturist to Government in his publication entitled *Report on the Export of Mango to Europe in 1932* (Bombay Agricultural Department Bulletin No. 170 of 1932). The Imperial Council of Agricultural Research sanctioned an amount of Rs. 5,100 to repeat the work in the mango season of 1933. We were this year unfortunate as regards cold storage accommodation and were able to get space in the purser's cool room on only 4 home-going P. & O. steamers. The reports on the consignments that were sent have not yet been received. There is apparently no difficulty in getting mangoes to Britain in good condition

in cold storage, but the main difficulty is to get space for small quantities at regular intervals.

(5) *Khandesh cotton-breeding scheme*.—The object of this work is to produce wilt-resistant cotton races of good commercial value. The work is carried on at Jalgaon, where the soil is wilt-infected, in order that the varieties may be put to a severe test. This new work has only just begun and a large number of selections are under study.

(6) *Broach cotton-breeding scheme*.—The object of this work is to produce a wilt-resistant high ginning cotton with good fibre qualities and yielding capacity superior to the local cotton. This work has also just begun and has been carried on, particularly on a considerable number of crosses in which Broach Deshi 8, a variety which is highly resistant, is one of the parents.

(7) *The Virus Diseases Research Scheme*.—Dr. Uppal, Plant Pathologist to the Government of Bombay, has gone to Europe in order to study in detail the latest methods for attacking the problem of virus diseases and is working at Rothamsted under Dr. J. Henderson Smith, an expert on these diseases. It is expected that Dr. Uppal will return to India about 12th June 1934 when this long-overdue research will be started.

FURTHER SCHEMES.

In the year under report the Bombay Provincial Agricultural Research Committee examined and recommended to the Imperial Council of Agricultural Research six new schemes—

- (1) Sheep-breeding scheme,
- (2) Goat-breeding scheme,
- (3) Poultry-breeding scheme,
- (4) Scheme for the study of eradication of *hariaali* grass by tractor ploughing,
- (5) Scheme for further study of the *koleroga* disease of betel-nut,
- (6) Scheme for the investigation of lime-juice production.

Sheep-breeding scheme.—This scheme had originally been put before the Advisory Board of the Imperial Council of Agricultural Research at the meeting held in New Delhi in February 1933. It was then referred to a sub-committee which met just before the next meeting of the Advisory Board. The scheme was modified to fit into an all-India plan and has been recommended to the Governing Body for sanction. It is proposed to locate this scheme in the Bhamburda forest reserve

near Poona which has been kindly lent by the Forest Department and to work with Deccan sheep and also to cross them with the Merino breed.

Goat-breeding scheme.—This scheme has already been recommended by the Advisory Board of the Imperial Council of Agricultural Research to the Governing Body for sanction and is to be located partly at the Agricultural College Dairy and partly at Manjri near Poona. The breeds to be worked with are the Surati and the Gujarati. The improvement of the goat should benefit enormous numbers of the poorer classes in India.

Poultry-breeding scheme.—This is an extension of the work at the existing Central Poultry Farm, Kirkee. The Advisory Board have recommended that the Imperial Council of Agricultural Research meet the net loss of this scheme. Further negotiations are proceeding between the Bombay Government and the Imperial Council of Agricultural Research regarding the financing of the scheme.

Scheme for the eradication of hariali grass by tractor-ploughing.—This was strongly recommended to the Governing Body by the Advisory Board and it is hoped that it will shortly be undertaken in order to fill up a very definite gap in our knowledge, namely, how to do twelve-inch ploughing in deep black soil for the eradication of hariali grass (*Cynodon dactylon*). In addition, very careful observations will be made on the weed itself to find out how long it lives in the clods turned up by the plough and to what extent it comes back in lands already ploughed.

The Koleroga and the Lime-Juice schemes were returned for further emendation.

Scheme for enquiry into the cost of production of cotton and sugarcane and their rotation crops.—The Indian Central Cotton Committee and the Imperial Council of Agricultural Research, together, have financed an important enquiry into the cost of production of sugarcane and cotton and their rotation crops throughout the whole of India. For the Bombay Presidency a special economic enquiry officer of gazetted rank has been appointed. Under him are four district supervisors (agricultural graduates) one each for the following districts :—

1. Surat
2. Khandesh (East)
3. Dharwar
4. Poona.

In the first three districts cotton and its rotation crops are being investigated and in the Poona District Sugarcane and its rotation crops.

Under each of these district supervisors are six village investigators. Each village investigator as to make notes on 8 holdings in each of 4 villages. No other province has got so big a provincial organization in this general scheme. The reports of the village investigators are dealt with by the District Supervisors who also tour to inspect the work of the village investigators and to draw their own conclusions. The provincial economic enquiry officer organizes the whole of the work for the Bombay Presidency and sends on the collected material to the Chief Economist (Mr. R. D. Kapur) at New Delhi. The scheme is for three and a half years and is to cost $5\frac{1}{4}$ lakhs. Its results will be of the greatest possible importance to agriculturists, economists, administrators, businessmen and in fact to all who have to deal with either crops or prices.

The Indian Central Cotton Committee has also agreed to finance a preliminary research on a curious disease of cotton which causes the leaves to diminish in size and causes the plant to be barren. This disease (provisionally called *the small-leaf disease*) which is always present in small amount was in the year under report more marked particularly in the Southern Maratha Country. This work will shortly be taken up.

An enquiry into the village consumption of cotton in order to improve the forecasts of cotton is also being financed by the Indian Central Cotton Committee throughout India and the Bombay Presidency will have its share of this scheme.

It will thus be seen that there is an enormous amount of well-planned thorough-going research schemes being conducted by the Department and financed by the Imperial Council of Agricultural Research and the Indian Central Cotton Committee.

In addition, there are researches financed by the Sir Sassoon David Trust which are mentioned in Chapter V of this Report.

The researches financed from these three sources do not, however, by any means cover the whole of the investigation work done in the Department. There are many other lines of work which will be found recorded in the individual reports attached as appendices to this main report. Attention may be directed to one or two of these lines of work.

Investigation of the Striga parasite of jowar.—This parasite is not a fungus but is a flowering plant which sends its suckers into the roots of jowar and if in sufficient quantity may stunt the jowar plant and seriously interfere with its development. It is known in the vernacular as *Tavali* in Marathi, as *Pilichiganakasa* in Kanarese and as *Agiyo* in Gujarati. It is common also in Africa where it is known as *Witch-weed*. The Economic Botanist has undertaken to study the conditions of its growth and has been concentrating on the germination of the seed. These seeds are exceedingly minute and look like a grains of pepper when poured on a white paper. He has shown that the seeds will not germinate unless there is a chemical stimulus derived from the jowar root itself or from an extract of the root. This work will be pursued and is likely to lead to important practical results.

The utilization of agricultural waste products has been the subject of investigation by various workers throughout the world and it has been taken up by the Agricultural Chemist to the Government of Bombay and at various farms. In a country where the supply of organic manure is always short, the development of any new sources of such a manure is of the greatest possible importance. The system briefly is :

1. All available farm refuse such as weeds, waste fodder, stubble and other plant material not otherwise useful is collected and evenly mixed.
2. Hard materials like cotton stalks, or stalks with waxy coating, are crushed longitudinally under carts or rollers so that they may absorb water and decompose easily.
3. This well-mixed farm refuse is spread as a bedding under the feet of the cattle for one or two nights.
4. All the material from the bedding with the dung, urine, etc., is collected, well mixed and then spread evenly in a manure pit, which is not deeper than 36 inches.
5. Spots of the cattle shed floor, wetted with urine, are scraped out, the material collected and thrown on the bedding before removing it to the pit. The hollows in the floor should be filled with fresh earth.
6. Trampling on the material in the pit is avoided, as trampling interferes with aeration.
7. A little earth and ashes is spread over the material and water added to it to keep it moist.
8. In the wet season instead of putting the material in a pit is put in a heap of two or three feet in height.

9. If and when possible, the pit or heap is turned over and moistened.

The combating of the wilt disease of betel-vine at Bassein has now reached a stage when the people are really convinced of its efficacy and are beginning to take to it in increasing numbers. This is a case where the work of the Department has saved an industry from destruction and in which patient combined research and propaganda are beginning to have the effect. A full account of the work will be found in the report of the Plant Pathologist.

As regards *Agricultural Engineering* the staff in this section has been very severely reduced and the post of Agricultural Engineer has been held in abeyance. The Assistant Agricultural Engineer has had his hands full with a good deal of construction work, but has carried on a certain amount of researches on implements and has succeeded in inventing a new seed-drill which incorporates the best features of Schutte's Patent Seed-Drill and is very much lighter and has a draft similar to that of the local drill.

A ring-making machine to supply wire rings for selfing cotton flowers has also been invented by him and is quite a success.

Considerable work has also been done on the apparatus for extraction of lime-juice. About half a dozen other useful implements are the subject of attention at present.

CHAPTER IV.

AGRICULTURAL EDUCATION.

THE POONA AGRICULTURAL COLLEGE.

The Poona Agricultural College came in for a good deal of discussion both public and private in the early part of 1933 when the question of its abolition or retention was before the public. The following Government communique issued on the 24th of April 1933 completely summarizes the views and action of Government on the Thomas Committee's recommendations :—

“ The Government of Bombay have carefully considered the recommendation made by the Reorganization Committee in paragraphs 265 to 269 of its report for the abolition of the Agricultural College, Poona. One of the criticisms levelled against the institution is that it has failed to attract youths who desire an agricultural education for its own sake and that it has been almost entirely filled by aspirants for employment in Government service. Government, however, consider that there is ample evidence to show that this is not generally true and that a large number of men who pass out of the college have afterwards been usefully employed in agriculture or its allied occupations. They are of opinion that the college serves a very valuable purpose in training not only the men required to fill the ranks of the Agricultural Department but also the students who take up agriculture or other allied occupations after passing through the college course.

If the college is once abolished it cannot be revived, and there is no other institution in this Presidency to take its place. The suggestion that Government should send annually for training at other centres the students required for the personnel of the Agricultural Department is open to serious objections. None of these colleges is within easy reach of this Presidency. Agricultural conditions in the provinces in which they are situated differ widely from those prevailing in this Presidency. The fees charged in some of them for Government scholars coming from provinces other than their own are very high. The disappearance of the college before any system of inter-provincial or federal agricultural colleges can be introduced would leave a very definite gap in the educational system of this Presidency and would probably tend to check its agricultural progress. In these

circumstances, Government do not consider that it would be sound policy to close the college.

In order, however, to increase the revenue of the college Government have directed that, with effect from the first term beginning from 10th June next, the tuition fee for the students from the Bombay Presidency should be increased from Rs. 120 to Rs. 150 per annum and that for the students from outside the Presidency from Rs. 240 to Rs. 300 per annum. Present students as well as new entrants should pay the fees at the increased rate.

Arrangements have also been made to reduce the running expenditure on the college farm by Rs. 8,000 and increasing its receipts by an amount of Rs. 4,000. Government propose to issue orders shortly regarding the percentage of admission to the college of students from within and outside the Presidency."

The general statement regarding retrenchment shown on pages 46-47 of this report, includes a considerable number of posts at the College which have been abolished during the last three years.

The main points in which further retrenchment is being carried out at the College are as follows :—

(1) The tuition fee for the present and new students from the Bombay Presidency has been increased from Rs. 120 to Rs. 150 per annum and that for the present and new students from outside the Bombay Presidency from Rs. 240 to Rs. 300 per annum.

(2) The running contingent grant of the Agricultural College Farm was fixed, after very careful scrutiny by the Special Accounts Officer, at Rs. 34,000 per annum at the beginning of the year 1927-28, but this grant was reduced from year to year owing to acute financial stringency and stood at Rs. 25,578 in the year 1932-33. The same has, however, been still further reduced to Rs. 18,238 from the beginning of the current financial year, and the cropping scheme of this Farm has been altered with all emphasis laid on larger receipts per acre.

(3) The Modi Bag, the orchard at the College is also being run as a business concern from the current year, one of the non-graduate assistant on the staff of that garden having been retrenched and the present contingent grant of the same having been reduced from Rs. 5,777 to Rs. 4,340.

It is the practice of the University of Bombay to send, once in three years, an independent inspecting committee to see the work of the college and report to the University. This committee consisting in the current year of Principal Tadulingam, the head of the Coimbatore Agricultural College, and Professor P. R. Awati, Professor of Zoology at the Royal Institute of Science, inspected the college and reported on it very favourably.

The College continues to give an education which is both vocational and cultural. The curriculum has been the subject of still further improvement and the proposals which have already been approved by the Academic Council of the University now await their further translation into concrete form by the addition of certain regulations to the University Hand-book and by the final approval of the Senate to the revised curriculum and regulations. It is hoped that these will be in force in June 1934.

Vernacular Agricultural Schools.—The two remaining vernacular agricultural schools, one at Devi-Hosur and the other at Dhulia, were also under consideration for abolition but in the end it was decided to retain these for the following reasons :—

“ The Government of Bombay have considered the recommendation of the Reorganisation Committee regarding the abolition of the vernacular agricultural schools at Dhulia and Devi-Hosur. The committee recommended the adoption of this course on the grounds that the schools were of purely local interest, the entries being only about 16 a year in each case, and there was no adequate return to the general tax-payer for the money spent on them. On the other hand it has been urged that there is a keen demand for the kind of education imparted in these schools and that they do not serve a merely local purpose, since students from adjoining districts take advantage of them. In the case of the Dhulia School, a further reason advanced in favour of its retention is that the cost of the school is in part paid for by contributions from several local bodies. After careful consideration of all these points, Government have come to the conclusion that these schools satisfy to a certain extent the demand for agricultural education in rural areas. Both schools are doing good work and it would not be a sound policy to close them. Government have, therefore, decided to continue them. At the same time they consider that there is some scope for reducing the expenditure incurred at

present on the schools and have asked the Director of Agriculture to explore the possibilities of effecting economies."

These two schools continue to do excellent work and are useful centres for the turning out of boys who have had a vocational education in agriculture.

Agricultural Bias Classes.—These are run by the Department of Public Instruction but are inspected by the Inspector of Agricultural Schools who is able to give considerable help and advice to the teachers and is preparing the details of set of experiments which they can carry out. He is also considering the improvement of the syllabus, particularly under the head of agricultural arithmetic.

CHAPTER V.

FINANCE AND ADMINISTRATION.

FINANCE.

The expenditure of the Department in the year under report was Rs. 11,22,464 as against Rs. 12,91,444 incurred in the previous year. The fall in expenditure was mainly due to general economy and retrenchment and to the application of the 10 per cent. emergency cut in pay all the year round instead of for only three months (December, January, February) in the previous year. The receipts of the Department increased from Rs. 1,85,772 in the year 1931-32 to Rs. 2,15,975 in the year under report. This increase was mainly due to the disposal of boring machinery and other articles of dead-stock etc. of the closed institutions.

Pages 64 and 58 of the Annual Reports for the years 1930-31 and 1931-32 respectively contain certain information regarding the staff retrenched from time to time. The following posts have been abolished in addition in the year under report :—

Name of post.	Remarks.
One Fitter	These posts from the section of the Agricultural Engineer were abolished with effect from 1st April 1932.
One Mechanic	
One Boring Mechanic	
Two Drivers	
One Clerk	
Two ploughmen	
One watchman	
One Boring Overseer	Abolished from 1st March 1933.
Two Graduate Assistants and Two Non-graduate Assistants	These posts out of those employed on Farms and Research work were abolished from 1st May 1933.
One Non-graduate Assistant	
One peon of the District Horticultural Officer.	Working at the Modibag ; post abolished from 1st June 1933.
	Abolished from 1st June 1933.

The Boring and the Kadbi Storage operations have been completely stopped from the beginning of the current financial year.

The subjoined table gives the amounts of subsidies received from the Indian Central Cotton Committee for the various

Schemes and the expenditure incurred therefrom during the year under report :—

Serial No.	Name of Scheme.	Amount of subsidy.	Amount of expenditure.
		Rs.	Rs.
1	The writing-up of the report of the Cotton Physiological Research Scheme at Surat.	19,199	18,844
2	The Boll-worm Clean-up Scheme in Gujarat.	32,790	29,899
3	The writing-up of the report of the Earias Boll-worm Propaganda Scheme.	2,420	2,117
4	The Cotton-Wilt Research Scheme at Dharwar.	3,134	3,134
5	The writing-up of the report of the Cotton-Wilt Research Scheme at Dharwar.	10,051	9,670
6	The Surat Cotton-Seed Distribution Scheme.	6,903	6,745
7	The Hubli Cotton-Seed Multiplication Scheme.	5,632	5,162
8	The Gadag Cotton-Seed Multiplication Scheme.	5,916	5,627
9	The Gadag Supplementary Scheme for the distribution and extension of Gadag I cotton-seed.	4,504	4,453
10	The Banilla Cotton-Seed Expansion Scheme in Khandesh.	39,327	37,524
11	The Athani Cotton-Seed Multiplication Scheme.	1,940	2,626
12	The Technological Assistant at Surat ..	4,019	3,558
13	The Jalgaon Cotton Breeding Scheme ..	6,320	6,160
14	The Broach Cotton Breeding Scheme ..	7,800	6,582
Total ..		1,49,955	1,42,101

The following amounts were received during the year from the Sir Sassoon David Trustees :—

Rs.

- (1) 575 Further grant for the investigation in connection with the improvement of grazing lands.
- (2) 2,324 Further grant for the testing of new nitrogenous artificial manures.
- (3) 2,438 Further grant for the castor research scheme.
- (4) 1,988 Further grant for the research work on wilt diseases of sann hemp.
- (5) 2,494 Further grant for the vegetable research scheme.
- (6) 1,500 For the purchase of the soil temperature tanks for the pathological research work.
- (7) 500 Further grant-in-aid to the Vernacular Agricultural School, Dhulia.

11,819 Total.

The following amounts were received from the Imperial Council of Agricultural Research in the year under report :—

Scheme.	Amount in rupees.
Deccan Surgarcane Research Scheme	.. 1,11,000
Large-scale trial shipments of mangoes	.. 4,945

ADMINISTRATION.

Mr. T. F. Main continued to hold the post of Director of Agriculture till 29th October 1932 when he proceeded on leave for about nine months and Dr. W. Burns, who returned from leave on 27th October 1932 was appointed to act in that post from that date. Mr. Main applied to Government for permission to retire as from July 26, 1933, and this was granted. Rao Bahadur P. C. Patil, who was holding the post of Professor of Agricultural Economics and was acting as Principal, Poona Agricultural College, retired from service on 22nd October 1932 and since then Dr. T. G. Shirname has been acting in the former post while Mr. V. G. Gokhale, Professor of Agriculture, has been acting in the latter post except on the 28th October 1932 when Dr. W. Burns held it. Mr. L. S. S. Kumar, Assistant Professor of Botany, continued to act as Economic Botanist except for one day on 28th October 1932 when Dr. Burns held the post, and Mr. V. M. Chavan, Graduate Assistant, has been appointed to officiate as Assistant Professor of Botany with effect from 28th July 1932. Mr. E. J. Bruen, Live Stock Expert to Government, Bombay, proceeded on leave for eight months from 18th April 1933 and Mr. H. G. Baluch, Assistant Professor of Dairying and Manager, Agricultural College Dairy, was appointed to act as Live Stock Expert during his absence and Mr. A. K. B. Cazi, Graduate Assistant, to act as Assistant Professor of Dairying and Manager, Agricultural College Dairy, *vice* Mr. Baluch, Dr. B. N. Uppal, Plant Pathologist to Government, proceeded on leave out of India for one year from 12th June 1933 to study virus diseases of plants, and Dr. M. K. Patel, Assistant Professor of Mycology, was appointed to act as Plant Pathologist and Mr. M. N. Kamat as Assistant Professor of Mycology.

Mr. G. S. Kulkarni, Plant Pathologist to Government, Bombay, who was on deputation in charge of the important Indian Central Cotton Committee. Scheme since 1923 retired from Government service from 1st April 1933.

A word or two should be said about those officers who have retired this year. Mr. Main joined the Department in 1905,

and was for some years its only Deputy Director. He served in various parts of the Presidency and put in a good many years in Sind. He was an admirable organiser, and thoroughly practical. He was Director from 1927.

Rao Bahadur P. C. Patil was one of the very early products of the agricultural teaching given when such instruction was still imparted in the College of Science. He joined the Department in the year 1906. He visited Europe fairly early in his career, and at a much later date underwent a course and obtained a degree in economics at the University of Wisconsin in the United States of America. He was the first incumbent of the new chair of agricultural economics at the College of Agriculture and the author of many publications on this subject.

Mr. G. S. Kulkarni was a later alumnus of the College of Agriculture, who specialised in Plant Pathology which subject he also studied in England and America. For several years he had been seconded from his post of Plant Pathologist, to be in charge of the Indian Central Cotton Committee's research scheme on cotton wilt. His successful conclusion of this work crowns his official career.

Messrs. W. J. Jenkins, V. A. Tamhane, G. S. Kulkarni, N. V. Kanitkar, V. R. Dharwarkar, Rao Saheb Vagholkar and Mr. K. V. Joshi continued to remain absent from their substantive appointments on deputation or otherwise during the year and the following officers held the respective acting vacancies :—

(1) Mr. C. S. Patel acted as Deputy Director of Agriculture, N.C.D.

(2) Dr. B. N. Uppal acted as Plant Pathologist to Government, Bombay.

(3) Mr. N. V. Kanitkar acted as Soil Physicist to Government, Bombay.

(4) Mr. V. N. Gokhale acted as Assistant Professor of Chemistry up to 15th March 1933 when Mr. N. Narayana was recruited afresh on probation for the post.

(5) Mr. R. Y. Hulkoti acted as Cotton Superintendent, S.M.C.

(6) Mr. V. V. Gadgil acted as Deputy Director of Agriculture, S.C.D.

(7) Mr. G. P. Patil acted as Divisional Superintendent of Agriculture, Deccan Canals.

Messrs. G. P. Pathak and V. C. Pavate continued to act as Cotton Superintendent, Gujarat, and Inspector of Agricultural Schools respectively. Messrs. S. V. Shevde and B. P. Deshpande continued to hold the temporary posts of the Cotton Superintendent, Banilla Cotton-seed Expansion Scheme in Khandesh, and the Cotton Entomologist, Broach, respectively under the Indian Central Cotton Committee. Mr. G. B. Patel was appointed from 16th May 1932 to the temporary post of the Cotton Breeder in charge of the Cotton Breeding Scheme, Broach, under the Indian Central Cotton Committee. Dr. J. K. Basu and Dr. R. D. Rege have been recruited for the posts of Soil Physicist and Crop Physiologist in the Sugarcane Research Scheme from 18th June 1932 and 6th July 1932 respectively. Mr. T. B. Pawar has been appointed from 1st April 1933 to the temporary post of Provincial Officer in charge Economics Enquiry Scheme financed from the funds of the Imperial Council of Agricultural Research.

PUBLICATIONS.

The Department has published during the year under report the following memoirs, bulletins and leaflets :—

Memoirs (now published as papers in the Indian Journal of Agricultural Science).

1. Nitrogen Recuperation in the Soils of the Bombay Presidency, Part III, by Rao Bahadur D. L. Sahasrabuddhe and Mr. N. V. Kanitkar, Vol. 2, Part 5, October 1932, page 455.
2. Blooming and Anthesis in Kolaba Rice, by Messrs. B. S. Kadam and G. G. Patil.

Bulletins.

1. Bulletin No. 168 of 1932—Preliminary Studies of Important Crops in the Bombay Deccan in the Post-war Period, by Rao Bahadur P. C. Patil, Dr. T. G. Shirname and Messrs. T. B. Pawar, and K. M. Shah.
2. Bulletin No. 169 of 1932—Cumin Powdery Mildew in Bombay, by Dr. B. N. Uppal and Mr. M. K. Desai.
3. Bulletin No. 170 of 1932—Report on the Export of Mangoes to Europe in 1932, by Dr. G. S. Cheema and Mr. P. G. Dani.
4. Bulletin No. 171 of 1932—Grassland Problems in Western India, by Dr. W. Burns, and Messrs. L. B. Kulkarni and S. R. Godbole.

5. A publication entitled "Principles and Practice of Farm Costing with Farm Studies" by Rao Bahadur P. C. Patil and Mr. T. B. Pawar.

Leaflets (with vernacular versions).

1. Leaflet No. 5 of 1932—Green fly or aphid on plants.
2. Leaflet No. 6 of 1932—Preservation of cattle urine as manure.
3. Leaflet No. 7 of 1932—Preparation of turmeric for the market.
4. Leaflet No. 8 of 1932—Control of cumin powdery mildew.
5. Leaflet No. 9 of 1932—Protection of crops from wingless grass-hoppers.
6. Leaflet No. 10 of 1932—A practical system of storing farm yard manure.
7. Leaflet No. 11 of 1932—Improved nagli varieties.
8. Leaflet No. 12 of 1932—Scum strainer in gul boiling.
9. Leaflet No. 13 of 1932—Manures for the cotton crop in Khandesh.
10. Leaflet No. 14 of 1932—Coconut cultivation.
11. Leaflet No. 15 of 1932—Effective propaganda work done in connection with agricultural improvements on Deccan Canals.
12. Leaflet No. 16 of 1932—How to feed cattle when at work.
13. Leaflet No. 17 of 1932—How to feed cattle when in milk.
14. Leaflet No. 18 of 1932—How to feed cattle when at rest.
15. Leaflet No. 19 of 1932—Feeding of poultry.
16. Leaflet No. 20 of 1932—Paddy store moth (surma) and its control.
17. Leaflet No. 1 of 1933—Improved rice strains for the Ratnagiri District.
18. Leaflet No. 2 of 1933—Sugar manufacture by the open pan system.
19. Leaflet No. 3 of 1933—Some insecticides, fungicides and appliances.

W. BURNS,

Director of Agriculture,

Bombay Presidency.

Poona, 25th September 1933.

APPENDIX A.

LIST OF TALUKA DEVELOPMENT ASSOCIATIONS ORGANISED UP TO DATE.

According to the scheme laid down in Government Resolution No. 3378, dated 5th June 1922, Revenue Department, 68 Taluka Development Associations were formed till last year 1931-32 as shown below :—

Division.	District.	No.
Gujarat	Surat	3
	Ahmedabad	1
	Kaira	2
North Central	East Khandesh	10
	West Khandesh	7
	Nasik	5
	Thana	4
	Kolaba	2
South Central	Poona	3
	Sholapur	2
	Satara	10
	Ratnagiri	4
Southern	Belgaum	4
	Bijapur	2
	Dharwar	7
	North Kanara	2

Three new Taluka Development Associations, viz. at Devgad in the Ratnagiri District and Parole and Jamner in the East Khandesh District, and one District Agricultural Association at Nasik were all registered during the year under report on the express understanding that the Associations will not be eligible for a subsidy from Government till the financial situation improves.

Subsidies amounting to Rs. 40,469 were granted during the year under report (1932-33) as against Rs. 39,248 granted in the previous year.

The Associations have been classed by the Divisional Boards of Agriculture in order of merit as under :—

Class A—The most successful or efficient.

Class B—Struggling associations which deserve help if possible.

Class C—Moribund associations.

Accordingly the number of associations in each Class is as under :—

Division.	Class.		
	A	B	C
Gujarat	5	..	1
North Central ..	7	18	3
South Central ..	7	10	2
Southern	9	6	..
Total ..	28	34	6

During the year under reference the Taluka Development Association at Kalyan, District Thana, was closed from 1st June 1933.

During the year under report (1932-33) Government granted lands free of assessment to the following Taluka Development Associations :—

- (1) *Chopda*—District East Khandesh.
- (2) *Shirpur*—District West Khandesh.
- (3) *Nasik*—District Nasik.

APPENDIX B.

SUMMARY OF WORK DONE AT THE POONA COLLEGE OF AGRICULTURE.
FOR THE YEAR 1932-33.

This is the twenty-fifth or the Silver Jubilee year of the College, which was suitably commemorated on the 12th of January, 1933.

Staff.

2. The total strength of the staff has remained the same as at the end of the last year as shown in the subjoined table classified by departments and grades of Personnel together with the amount of work to be done in connection with teaching by each department.

Name of the Department.	Head of Department.	Gazetted Assistants.	Non-gazetted Lecturers and Demonstrators.	Percentage of total for college teaching.
Agriculture including Animal Husbandry	1	2	5	38
Horticulture	1	..	1	5.5
Botany	1	1	1	9
Chemistry	1	1	1	13.5
Engineering, Physics and Mathematics.	1	..	2	18
Entomology	1	..	1	5
Plant Pathology	1	1	..	5
Economics	1	..	1	6

Rao Bahadur P. C. Patil was in charge of the College till 22nd October 1932 and Mr. V. G. Gokhale thereafter during the rest of the year vice the permanent Principal Dr. W. Burns appointed to act as Director of Agriculture, Bombay Presidency.

In the absence of Dr. Burns on leave and deputation, Professor L. S. S. Kumar acted as Professor of Botany and Mr. V. M. Chavan as Assistant Professor of Botany, throughout the year.

On Rao Bahadur Patil's retirement, Dr. T. G. Shirname who returned from England after getting Ph.D. degree in Economics has been appointed to officiate as Professor of Agricultural Economics, in Class I service.

Rao Bahadur D. L. Sahasrabuddhe went on 3 months' leave from 1st April 1932. Mr. V. N. Gokhale acted as Professor of Chemistry in his place and Mr. B. H. Patil acted as Assistant Professor of Chemistry from 10th June 1932 to the end of the month.

Mr. N. Narayana who has been appointed Assistant Professor of Chemistry joined on March 15th, 1933. Mr. V. N. Gokhale who was acting as Assistant Professor of Chemistry reverted as lecturer and is now on leave.

Mr. H. G. Baluch, Assistant Professor of Dairying has been appointed to act as Live Stock Expert to Government from 13th April 1933, Mr. A. K. B. Cazi having taken his place as acting from 28th April 1933.

Dr. B. N. Uppal went on deputation to England for 1 year on 12th June 1933 and Dr. M. K. Patel is appointed to act as Plant Pathologist in his place and Mr. M. N. Kamat as acting Assistant Professor of Mycology vice Dr. Patel.

Many other changes took place in the staff of lecturers and demonstrators owing to retrenchment.

Equipment.

3. There has been no change in this during the year. Owing to the heavy reduction in the Library grant, it is just sufficient to cover the cost of the periodical journals and magazines, and only 31 new books could be added. The total number of books in the Library apart from periodicals is now 7,430.

Curricula.

4. The revised curricula referred to in the last year's report are still under the consideration of the Bombay University.

5. *Triennial Inspection of the College by the Bombay University.*—A triennial inspection committee of the University of Bombay consisting of Principal Rao Bahadur Tadulingam of the Coimbatore Agricultural College and Professor Awatee of the Royal Institute of Science, Bombay, inspected the College on 6th and 7th February 1933. On the whole they seemed to be satisfied with the instruction and equipment of the College. Their report is awaited.

Studentship.

6. The number of students that attended during the year was as follows :—

Class.	First term.	Second term.
I. Ag.	53	55
Junior B.Ag.	55	55
Senior B.Ag.	66	68

Examination results.

7. In the Final Examination for the degree of Bachelor of Agriculture held in March 1933, 86 men appeared and 77 passed making up a total pass percentage of 89·5. The following was the distribution according to optional subjects :—

		Number appeared.	Number passed.
Intensive Study of Certain Crops	{ Cotton group ..	2	2
	{ Sugarcane group ..	6	5
Advanced Plant Breeding ..	..	17	15
.. Agricultural Chemistry ..	..	8	7
.. Animal Husbandry and Dairying ..	..	6	5
.. Agricultural Economics ..	..	14	12
.. Horticulture ..	..	23	21
.. Plant Pathology ..	..	10	10
		86	77

In the part examination which may be taken at the end of the Junior year of the B.Ag. course, 52 students appeared for Botany and Plant Pathology. 49 students passed in both the subjects, one passed in Botany only and one in Plant Pathology only. One student failed in both the subjects.

8. In the Intermediate examination in Agriculture, 62 students appeared ; of these, 46 passed of which 4 were placed in the first class. This gives a pass percentage of 76·1.

Comparison with the previous results.—During the last triennium, the passing percentages have been as follows :—

	1931.	1932.	1933.
B.Ag. Examination	74·7	70·7	89·5
I.Ag.	63·8	66·6	76·1

These results show as ever that the teaching done in this College amounting to about six hours per day on an average, two-fifth of which is given in lectures and three-fifth in the practicals, builds up to a high standard even the rather poor material which is received at starting in this College.

9. On account of retrenchment, the short (one year) course class has been in abeyance for want of staff.

10. *Special courses.*—The following special courses were given during the year :—

(i) The Kumar Shree Nirmal Kumarsinhji, brother of His Highness the Maharaja of Bhavnagar (Kathiawad), was admitted from January 1933 as a special student for a general course of 18 months consisting of selected college teaching and special private tuition from experienced teachers of this College in various subjects.

(ii) Other Sectional courses given have been noted in the Sectional summaries appended along with this report.

11. *Masters in Agriculture*.—One of the B.Ag.'s who has been working under Professor D. L. Sahasrabuddhe of this College for his Master's Degree in Agriculture submitted his thesis and was declared to have passed.

Careers of Graduates.

12. In addition to the usual avenues of careers for agricultural graduates, a number of sugar schemes which have been springing up, and also the research schemes of the Imperial Council of Agricultural Research in India have afforded and will continue to afford an increasing scope for the employment of graduates.

It has been decided to establish a Poona Agricultural College Graduates Employment Bureau to act as a medium for bringing in a closer touch between our graduates and the possible employing agencies.

Admissions for 1933-34.

13. The number of candidates who applied for admission to the I.Ag. class and of those who were admitted and those who were actually present in the College on June 30 (20 days after the new session started) are given below :—

	Applied.	Admitted.	Actually joined.
Bombay Presidency including Sind and Indian States within its boundaries ..	60	59	38
Other parts of India ..	23	19	7

The Educational standard of the new applicants from the Presidency is somewhat higher than in the past, about two-fifths having scored above 40 per cent. in their First Year Arts Examination. All those who have come from universities other than Bombay have to pass the Intermediate Examination in arts or science. In all there are 4 graduates.

The number of applicants and of those who actually joined has, it will be noticed considerably fallen as compared with that in the previous years. The sole reason for this appears to be the increase of fees from Rs. 120 to Rs. 150 for the insiders and double the amount for outsiders. Almost all the Indian States, small as well as large, which were so long under the Bombay Government having been transferred to the control of the Government of India, the students coming in from those parts, who contributed substantially to this College in the past have now become outsiders and unable to pay double the fees. Thus men who are capable but have the misfortune of small means have been debarred from this branch of higher education.

14. *Admissions for Post-graduate work*.—Including 2 new who have been registered during the year of report, there are in this year 7 students carrying on their post-graduate work under Professors of this college recognised by the Bombay University.

Scholarships.

15. The number of Government scholarships tenable for 3 years continued to be the same as in the last year, namely,

Presidency proper—

- 5 for Backward communities and Mahomedans,
- 3 General competition.

Sind—

- 2 for Mahomedans,
- 2 for general competition.

The Students' Hostel.

16. The total number of students accommodated in the hostel is 120 whereas there is accommodation for 132 students.

Students' Co-operative Stores.

17. In order to bring about economy in the cost of boarding and other supplies to students and at the same time give the students an opportunity to gain practical experience in the management of a co-operative concern about which they are taught the theory in that course, Students' Co-operative Stores has been started and registered under the Bombay Government Co-operative Act since 1932. 87 students and 9 members of the staff have joined the same. A total business of Rs. 5,073-8-9 was done up to the end of April 1933 yielding a dividend of 6½ per cent. on the share capital and about 6 per cent. rebate from the market price of goods sold.

Athletics and Social Activities.

The standard and efficiency of the College Gymkhana continued to be high. The playground was fully made use of under the inspiring and active association of Dr. Cheema as the Chairman of the Gymkhana.

In the Inter-Collegiate Sports, the College carried off 2 prizes, namely:—(1) Basket ball championship and (2) Weight lifting.

18. The U.T.C. platoon under Lieutenant K. S. Kulkarny was full and went in camp during X'mas. Lieutenant K. S. Kulkarny is now promoted to be 2nd in command of B Company and Professor V. M. Chavan has been taken up as commander of the College Platoon. The Rover scout troop had also good strength during the year under report and continued its activities under Mr. A. A. Vasavada. As usual they put up a fine display at the time of their annual camp-fire held in February 1932.

19. *Social Gathering.*—The Annual Social Gathering of the Students and staff was held as usual on 8th September 1932 when Dewan Bahadur Sir T. Vijayaraghavacharya presided and addressed the students and distributed the prizes. Many distinguished guests honoured the function.

Students' Literary Activities.

20. *The Poona Agricultural College Magazine*.—This was continued as in the past under the management of students assisted by a staff-editor. It continued to be subscribed to as before.

21. The Agricultural Association and Debating Society had a fairly good programme of meetings.

Students' Guardianships.

22. These have been instituted from the College year beginning with June 1933 with a view to establish with students personal and friendly relations, to look after their general welfare and to help them in various ways. Every senior member of the staff has been entrusted with 7 to 8 students for the purpose.

Aid and Assistance to the public.

23. *Veterinary Hospital*.—Apart from the main purpose of practical instructions to the students of the College it has continued to do service to the public, as in the past. The number of in and out-patients during the year was 462 and 5,785 respectively.

Research and Advice.

All the staff mentioned in the beginning of the report have carried on research and advice in the time available after satisfying the needs of teaching and administration of their respective sections. Summaries of such research and advisory work are embodied in the reports of the respective heads of sections which are appended to the annual report of the Department.

Visitors.

24. Amongst the distinguished visitors, the College had the honour of receiving during the year, the following may be prominently mentioned.

(1) The Raja Sahab of Sangli, (2) The Chief of Ramdurg, (3) the heir apparent of Idar, (4) Dewan Bahadur Sir T. Vijayaraghavacharya, Chairman of the Imperial Council of Agricultural Research, (5) Dewan Bahadur S. T. Kambli, the Honourable Minister for Education to the Government of Bombay, and (6) Mr. Ramamurthy, Director of Agriculture, Madras.

V. G. GOKHALE,

Acting Principal,

COLLEGE OF AGRICULTURE :

College of Agriculture, Poona.

Poona, July 17, 1933.

APPENDIX C.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF
AGRICULTURE, NORTH CENTRAL DIVISION, FOR THE
YEAR 1932-33.*I. Staff.*

I was in charge of the Division during the year. Messrs. S. H. Prayag and N. V. Bhagwat continued to work as Cotton Breeder and Inspector of Agriculture, Khandesh respectively during the year.

2. Mr. S. V. Shevde continued to work as Cotton Superintendent, under the Banilla Cotton Extension Scheme and Mr. D. M. Kulkarni worked as Superintendent of the Bhadgaon Farm under the same scheme.

3. Messrs. N. L. Desai and M. V. Gadkari were incharge of the Jalgaon Farm and Karjat Rice Research Station respectively while Mr. S. S. Surve worked as Head Master of the Dhulia Agricultural School.

4. Mr. M. R. Gokarn was in charge of the South Thana District and in addition continued to work as Inspector of Agriculture for Thana and Kolaba Districts. Messrs. K. B. Modi and G. P. Jambhekar worked as District Agricultural Overseers North Thana and Kolaba Districts respectively. Messrs. M. B. Ghatge, J. N. Purandare and R. B. Nimbalkar were in charge Nasik, Malegaon and Shahada sections.

5. Mr. D. M. Thakar continued to work as Head Clerk in the office of the Deputy Director of Agriculture, North Central Division during the year except from 3rd January 1933 to 2nd April 1933 when Mr. Y. M. Mehendale worked as acting Head Clerk.

II. Season.

6. Rains broke in unusually late in Khandesh and Nasik Districts. Effective rains began in the first week of July and sowings were completed by the middle of the month.

7. In Konkan Districts of Thana and Kolaba, rains began earlier in the first week of June and sowing and transplanting of rice was done in time.

8. The course and distribution of rainfall was not favourable to crops. The cotton crop being sown late yielded an eight anna crop. Groundnut crop took to leafy growth and the yield was less than normal. Bajri and Jowar crops were normal in Khandesh while those in Nasik were spoiled by continuous rains in July and August. Rice crop was damaged by heavy late rains in October which lodged it badly. Rabi crops of wheat, gram, etc. were normal in all Districts.

The irrigated crops of sugarcane, onions, wheat, etc. were normal. The grape crop in the Nasik District was good. There was trouble from downy mildew; but people took to spraying with Bourdeaux mixture in time and the crop was saved to a large extent. The mango crop in Salsette was poor and yielded only a four anna crop.

9. The prices of agricultural produce continued to be low. The price of kapas was Rs. 11 to Rs. 14 per maund of 168 lbs. against Rs. 15 to Rs. 18 of the last year. The prices of groundnut varied from Rs. 9 to Rs. 11 per palla of 240 lbs. against Rs. 14 to Rs. 15 of the last year. The prices of rice in Konkan Districts ruled extremely low and there was much hardship.

10. *Insect and fungoid diseases.*—Milli-pedes destroyed the germinating jowar and bajri seedlings in some parts of Khandesh and the crops had to be resown. There was rat trouble in Sindkheda and Shabada talukas of West Khandesh. The young cotton crop was badly attacked by aphids and the castor crop in Taloda taluka of West Khandesh was damaged by semi-lupers. The wilt on cotton was not serious. The chilli crop was attacked by virus disease in some parts of the Division. Downy Mildew on grapes in the Nasik District was prevalent while the wilt on betel vines in Bassein taluka was also common during the year.

III. Research and experimental work.

11. *Cotton.*—As mentioned in paragraph 20 of last year's report, the Khandesh Cotton Breeding Scheme came into operation during the year. The headquarters of the Cotton Breeder were transferred to Jalgaon. The principal line of work is isolation of cotton races homozygous for wilt resistance and selection of wilt resistant types of good commercial value. During the year the following were tried in highly wilt-infected soil for observing the incidence of wilt resistance:—

(a) 373 plant selections obtained from wilt affected area in East Khandesh.

(b) The different form of Bani and Comilla isolated last year.

(c) N. R. 5, Malvensis and Verum 262.

In each of the above the susceptibility varied from 8 to over 80 per cent. Seven strains in (a) showed high resistance; but no strain showed complete immunity.

12. *Yield tests of Banilla and N. R.*—Banilla and Farm N. R. were compared in one guntha strips replicated eight times on the Dhulia Farm and the following statement shows the results obtained during the year:—

Variety.				Average mean yield of kapas per guntha.	Average yield of kapas per acre.	Ginning percentage.	Average lint out-turn per acre.
				Lbs.	Lbs.		Lbs.
Banilla	..	..	..	12.2	488	38	185.4
Farm N. R.	..	..	..	14.8	592	34	201.2

13. When compared in money value the results stand as under :—

Variety.	Average lint out- turn per acre.	Value per bale of 392 lbs.	Value of lint per acre.	Difference over N. R.
	Lbs.	Rs.	Rs. a. p.	Rs. a. p.
Banilla ..	185.4	80	38 0 0	2 2 0
Farm N. R. ..	201.2	70	35 14 0	....

14. The five guntha replications of Banilla and Farm N. R. mentioned in paragraph 13 of last year's report were continued during the year and the sub-joined table gives the results obtained :—

Variety.	Yield of kapas per acre.	Average ginning percent- age.	Outturn of lint per acre.	Value of lint per acre.	Net gain per acre for Banilla.	Remarks.
	Lbs.		Lbs.	Rs. a. p.	Rs. a. p.	
Banilla ..	336	38	127.6	25 14 0	0 14 0	The crop was normal.
Farm N. R. ..	412.3	34	140.1	25 0 0	....	

15. From the above statements it will be seen that Banilla has yielded less than Farm N. R. by about 22 per cent ; but in money value it has given higher value than Farm N. R. due to higher ginning and better quality.

16. *Spinning tests of Banilla and other cottons.*—Samples of Banilla cotton from the Dhulia and Jalgaon Farms and commercial samples of the same from different localities in Khandesh were sent for spinning tests to the Matinga laboratory during the year. Samples of N. R. and corresponding local commercial cottons were also sent for comparison and spinning values as adjudged at the laboratory were as under :—

Dhulia farm Banilla ..	15's.	Dhulia N. R. ..	9's.
Jalgaon farm ..	13½'s.	Jalgaon N. R. ..	10's.
Amalner ..	16½'s.	Amalner Local ..	10's.
Pachora ..	14's.	Pachora ..	10's.
Shirpur ..	18's.	Shirpur ..	10's.
Chalisgaon ..	11½'s.	Chalisgaon ..	10's.

17. From the above statement it will be seen that the quality of cotton during the year under report was better than that of the last year. Last year the Banilla cotton from the Dhulia Farm spun up to 21's ; but the sample probably was from the breeding area and was not comparable. The sample of Banilla from Chalisgaon appears to be very poor. On an average it can be said that Banilla is suitable for 14's to 15's as against 10's of the local.

18. *District trials of Banilla and local cotton.*—Our experience definitely shows that Banilla cotton yields less than farm N. R. ; but in the District pure N. R. is sown only on a few hundreds of acres while the general area is sown by people with the seed locally available. So with a view to see the comparative yields of Banilla and local cottons as sown by cultivators, village trials were carried out at 18 different places in the District. Out of 18 trials, Banilla yielded more than local in 9 cases ; in 4 cases the yields of Banilla and local were nearly equal ; while in 5 cases the yield of local was more than that of Banilla.

19. *Jalgaon farm.*—The general cropping of the farm and the average yields of different crops were as under during the year.

Name of crop.			Area.	Yield per acre.	Remarks.
			A. g.	Lbs.	
N. R. Cotton	..	..	12 22	733	The soil was rich.
Banilla cotton	..	..	53 23	516	
Local cotton	..	..	1 2	397	Unmanured.
Spanish Groundnut	..	..	50 8	1,241	
Jowar and Udid	..	..	..	..	
Jowar and Udid mixed	..	..	22 5	Jowar 1,519 Udid 212	
Wheat	..	..	42 33	878	
Gram	..	..	3 23	480	
Corriander	..	..	2 0	631	

20. *Cotton.*—As it was decided to put larger area under improved wheat strains for multiplication purposes, the area under cotton was reduced to 67 acres and 7 gunthas during the year. All the cotton was ginned on the farm and the lint sold by auction. Banilla realised Rs. 87-8-0 per boja of 392 lbs. while N. R. realised Rs. 78 only. The ginning percentage of Banilla was 38.3 as against 34.4 of N. R.

21. *Wheat.*—Strains Nos. 224, 168, 162, 808 and 809 were sown for multiplication purposes on the farm and the following quantities of seeds were obtained for distribution in the ensuing season :—

				Lbs.
Strain No.	224	..	..	18,500
" "	168	..	..	5,000
" "	162	..	..	3,500
" "	808	..	..	325
" "	809	..	..	170

22. *Experimental work.*—A large number of manurial and other experiments were being carried out on the Jalgaon Farm during the last three or four years on cotton, groundnut, wheat, jowar etc. The detailed results of these are recorded in the experimental record. These experiments will be discontinued from the ensuing season and will be replaced by a new series of field experiments based on modern methods.

23. *Trial of new crops.*—During the year Pusa gram No. 58 was compared with the local yellow ; but it was not found suitable for the tract as its grain was smaller and was late in ripening by about a month.

24. *Trial of new implements.*—The Assistant Agricultural Engineer sent a winnower for trial on jowar and wheat crop on the farm. It was found suitable for the work and will be appreciated by cultivators in tracts where the winds are not favourable at the time of winnowing operations.

25. *Farm demonstrations.*—A demonstration of the standing wheat crops and useful implements was held in January 1933 under the joint auspices of the District Agricultural Association, Jalgaon, and the district staff of the Department when nearly 300 cultivators visited the farm.

26. *Distribution of seeds and implements.*—The farm serves as a centre of seed distribution for cotton, groundnut, wheat and other seeds and during the year nearly 58,000 lbs. of seed of different kinds worth nearly Rs. 3,200 were distributed from the farm. It also serves as a depot for implements and spares and during the year spares and implements worth Rs. 177 were sold to the public.

27. *Karjat Farm.*—During the year the manurial experiments on rice at Karjat were recast with a view to determine the most economic quantity of sulphate of ammonia and the best time of its application. The experiment was laid out in five replications, each replication receiving seven treatments on one guntha plots as under :—

- (1) *Nil.*
- (2) 40 lbs. of N. in one dose (i.e. when normal tillering ceases).
- (3) 40 lbs. of N. in two doses (first as above and the second at the time of the swelling of the sheath).
- (4) 40 lbs. of N. in three equal doses (i.e. when tillering begins, when it ceases and last at the time of the swelling of the sheath).

Treatment.	Average yield per acre.	
	Grain.	Straw.
	Lbs.	Lbs.
<i>Nil</i>	2,276	2,068
40 lbs. of N. in one dose	3,370	4,228
40 lbs. of N. in two equal doses	3,256	3,510
40 lbs. of N. in three equal doses	3,437	3,639
60 lbs. of N. in one dose	3,270	4,552
60 lbs. of N. in two equal doses	3,481	4,288
60 lbs. of N. in three equal doses	3,804	4,268

The results show that the best results are obtained when the manure is applied in three doses. When applied in one dose, the straw increases disproportionately at the expense of the grain.

28. *Amelioration of the lowering of proteid content of rice grain.*—One of the drawbacks of sulphate of ammonia as manure on rice is that it lowers the proteid contents of the grain. To see whether this can be ameliorated by addition of phosphatic manures, pot experiments were conducted in which nici-phos, bone ash and calcium phosphate were added to the sulphate of ammonia. (=60 lbs. N.) in the proportion of 1 : 1 of N. and P. The results of analysis show that addition of phosphatic manures did not ameliorate the proteid content of the grain. In the case of nici-phos the proteid content was strikingly less.

29. *Determination of quantity of lime lost due to the application of sulphate of ammonia.*—For this purpose two plots are reserved one without any manure and the other receiving 300 lbs. of sulphate of ammonia in three equal doses. The analyses of the soil of these plots before and after harvest show that by the application of 300 lbs. of sulphate of ammonia the lime content of the soil was reduced by 3 per cent. during the first year ; while organic matter was lost to the same extent over no manure. The acidity of the soil was considerably increased as supported by PH determination. These results indicate the necessity of a complete manure for rice instead of nitrogen alone.

30. *Amelioration of lime content in the soil displaced due to application of sulphate of ammonia.*—To see whether the lime lost due to application of sulphate of ammonia can be ameliorated by addition of lime in the soil before application of sulphate of ammonia, pot experiments were laid out in which lime in the form of shahabad lime stone was mixed in the surface 9 inches of the soil, the quantity being $1\frac{1}{2}$ times that displaced by sulphate of ammonia. P H value of the soil and proteid content of the grain were determined and the results show that the addition of lime improved PH value of soil and also the nitrogen content of the grain.

31. *Quantities and form of lime lost in the soil due to sulphate of ammonia.*—It was observed in the last season that with increased quantity of sulphate of ammonia, more lime was washed away through drainage water. In order to confirm this the experiment was repeated in the year under report and it was decided to determine the form in which lime was displaced from the soil by the addition of sulphate of ammonia. This year's results confirmed the findings of the last year that more lime is washed away with increased quantity of sulphate of ammonia. The largest quantity of lime washed out was in the form of carbonates, then came sulphates and chlorides.

32. *Comparison of sulphate of ammonia and nici-phos as manure for rice.*—This was studied in pots in five replications each. The manures were applied on the basis of 60 lbs. of N. per acre in one, two and three doses at different stages of growth. Nici-phos gave some increase of yield over sulphate of ammonia ; but it was not significant. Moreover, nici-phos reduces the proteid contents of grain much more than sulphate of ammonia and is more costly also ; so there are few chances for its use as manure for rice in place of sulphate of ammonia.

33. *Dhulia School Farm.*—To see whether seived bajri seed will give any advantage over unseived seed, an experiment was laid out on the Dhulia Farm where seived and unseived bajri was sown in four

replications of 10 gunthas each. There was no material difference in yields. The average yield of sieved plots was 539 lbs. as against 523 lbs. of the unsieved.

34. *Cattle Breeding Farm at Sangvi.*—The total strength of the herd was 56, comprising 25 cows, 12 female calves, 10 male calves, 2 breeding bulls and 7 work cattle. During the year 7 premium bulls were issued to different Taluka Development Associations. There were 13 deaths during the year of which 5 were due to abortion. It appears that abortion is of a contagious type and this is being investigated into with the help of the Veterinary Department.

35. *Cattle Breeding Farms of Taluka Development Associations and others.*—The Jalgaon Taluka Development Association completed the organisation of their cattle breeding farm at Pimple and it was formally opened by the Honourable Minister of Agriculture Diwan Bihadur S. T. Kambli on 24th October 1932 in the presence of a large number of officers and cultivators of the district. The Jamner Taluka Development Association continued to maintain their herd of Nimari cattle. The Khillari herd maintained by Mr. Deshmukh of Ner in Dhulia taluka is doing well and he sold several bulls for breeding purposes in the district.

36. *District trials.*—A large number of manurial and varietal trials were carried out in the districts and some of the interesting ones are given below :—

(a) *Girna Canal Plots.*—The fifteen acre plot at Agar was worked during the year as per plan laid out. Banilla cotton sown with one pre-seasonal watering by the end of May gave on an average 680 lbs. of kapas per acre. Pusa 4 wheat sown after sann as green manuring yielded 525 lbs. per acre against 300 lbs. of the same sown after bajri manured with oil cakes at the rate of 300 lbs. per acre. Spanish groundnut yielded at the rate of 833 lbs. per acre and Akola bajri gave an yield of 559 lbs. per acre. J. 213 variety of cane was compared with Pundia at four places in the canal area ; but it yielded less than Pundia.

(b) *Trials of improved wheats in Khandesh and Nasik Districts.*—Wheat strains Nos. 162 and 168 and 224 were compared against local both in West and East Khandesh and it was observed that improved wheats were decidedly better than local in point of yield and strain No. 168 was found better than 162. Similarly strains Nos. 808 and 809 were found superior to local Pivla in the Nasik district and further trials will be conducted in the next season.

(c) *Manurial experiments on rice with sulphate of ammonia.*—In all 14 village-trials were carried out in Thana and Kolaba districts during the year. It was settled to apply 200 lbs. of sulphate of ammonia, half at the time of tillering and half at pre-flowering. But this was varied according to field conditions at the time of the application of the manure. The dose also was changed according to field conditions from 150 lbs. to 250 lbs. per acre. Out of 14 cases there was economic loss in only four cases and this was chiefly due to late rains at the time of harvesting while in all cases the yield of grain and straw was more than that in the check. The yield of grain was generally 300 to 500 lbs. more.

IV. Organisation.

37. *Taluka Development Association.*—During the year there were thirty registered Associations distributed as under in the Division :—

	Nos.
1. East Khandesh	12
2. West Khandesh	7
3. Nasik District	5
4. Thana „	4
5. Kolaba „	2

38. All the Associations did good work during the year with few exceptions. They are forming a very useful link between the people and the officers of the Agricultural Department for propaganda work. Appendix A gives their financial position and the activities carried on by them.

39. The Jalgaon and Jamner Taluka Development Associations are maintaining cattle breeding farms for Nimari cattle. The Dahanu Taluka Development Association has started a small poultry farm where white Leg-horn and Rhode Island red types of poultry are bred. The Bhusawal Taluka Development Association arranged a cattle show when the Honourable Minister of Agriculture visited Bhusawal in October 1932. The Nasik and Ozar Taluka Development Associations arranged shows at Trimbak and Sukene respectively. Palghar, Dahanu and Umbergaon Associations took leading part in the Agricultural and Cattle Show at Betegaon. The Dhulia Association arranged ploughing competitions at Kusumbe and Ner when nearly 600 cultivators attended and prizes worth Rs. 33 were distributed.

40. *Non-credit Co-operation.*—The Fruit Sale Society at Waghoda in Raver Taluka was not able to do direct work ; but continued to give advice to plantain sellers about up-country markets. The Nashirabad Crop Protection Society did good work as usual and it is gratifying to note that similar organisations have been formed at Asoda, Bhadli and Yawal during the current year. There are co-operative sale societies at Dhulia, Jalgaon, Pachora and Malegaon ; but only the Jalgaon Sale Society takes active part in agricultural propaganda. The Agricultural Organiser at Palghar organised a Chilli Sale Society at Chinchani in Dahanu Taluka which did good work during the year. The Palghar Paddy Sale Society is financing its members on the security of paddy and during the year there were 56 members to whom Rs. 14,032 were advanced. The Palghar Taluka Agricultural Requisite Supply Society sold nearly one lac lbs. of castor cake to members for manure. Recently a Chikoo Sale Society has been organised at Dahanu and if it is found to work satisfactorily, societies for bananas and mangoes will be organised. Taluka Shetkari Sangha have been organised at Bhiwandi, Wada and Shahapur and with their co-operation demonstrations were arranged at several places in South Thana.

41. *Business Firms.*—The Imperial Chemical Industries Ltd. (India) who deal in fertilisers engage men in the Districts for propaganda work and the staff of the Agricultural Department remains always in touch with them and arrange manurial trials and demonstrations in the District.

V. Propaganda.

42. *Banilla cotton extension.*—This scheme is financed by the Indian Central Cotton Committee and it completed two years this year. Selling was carried out at Dhulia Farm in 6 acres and 22 gunthas and 864 lbs. of selfed seed was procured from it. From this 800 lbs. were supplied to the Bhadgaon Farm for multiplication.

43. *Bhadgaon Farm.*—During the year the site of the Patonda farm was abandoned and an area of 208 acres was selected on the site of the old Bhadgaon Farm and rented for four years. The land was not in good condition and was infested with weeds. The whole area was ploughed up with a tractor and the cropping and yields were as under during the year :—

Crop.		Area.	Total	Yield per	Remarks.
			yield.	acre.	
		Acres.	Lbs.	Lbs.	
Cotton	..	102	27,532	270	Was manured with 5 cart-loads of F.Y.M. and 200 lbs. of castor cake and 40 lbs. of sulphate of ammonia per acre.
Groundnut	..	59	41,654	706	
Jowar	..	23	5,474	238	Germination was spoiled by centipedes.
Bajri	..	24	5,856	244	

44. The rains were very late ; so the sowing could only be done in the middle of July. Consequently the yields of crops were below normal and the total quantity of cotton seed obtained was 15,860 lbs. which was sent to Bharwas village for further multiplication in the coming season.

45. *Multiplication and distribution of cotton seed in the District.*—The arrangement is to grow the pure seed from the seed farm in a concentrated area of about a thousand acres ; so that it can be controlled and purified efficiently. From this controlled area the seed is further distributed at different centres so as to cover an area of ten thousand acres from which seed for general distribution in the district is collected. During the year the seed from the seed farm was distributed in Bharwas village near Amalner and it covered 1,012 acres. The average yield was 225 lbs. of seed cotton per acre and the ginning outturn was 37 per cent. The total quantity of seed procured from this area was 140,920 lbs.

46. During the year the multiplication centres were five and the following table shows the area and seed obtained from each centre.

Centre.	Area.	Average yield per acre.	Average ginning percent- age.	Quantity of seed obtained.
	Acres.	Lbs.		Lbs.
1. Amalner	899	230	37	146,452
2. Shirpur	492	260	37	82,334
3. Erandol	439	300	38	28,540
4. Pachora	1,086	235	38	153,150
5. Chalisgaon	534	230	37	57,180
Total	3,450	..	..	467,658

47. After meeting the requirements of the controlled and multiplication centres about 364,000 lbs. of seed sufficient for 20,000 acres was available for general distribution.

48. On an average Banilla cotton realised Rs. 15 to Rs. 16 per maund of 168 lbs. as against Rs. 13 to Rs. 14 of the local. The average ginning percentage was 37 against 33·5 of the local.

49. *Rice seed distribution.*—(a) *North Thana.*—In this tract strains Nos. 226, 401 and 184 are found suitable and during the year 2,170 lbs., 1,400 lbs. and 3,045 lbs. of rice seed of the respective strains was distributed to 25 registered seed growers sufficient to cover 132 acres. The estimated yield from this area was 147,000 lbs. sufficient for nearly 3,000 acres in the ensuing season.

(b) *South Thana.*—In this tract strains Nos. 42 and 184 are more in demand and during the year 8,790 lbs. and 4,340 lbs. of seed of these strains were distributed to registered seed growers, sufficient to cover about 260 acres. The estimated yield from this area was nearly 390,000 lbs. of seed sufficient for nearly 8,000 acres.

(c) *Kolaba District.*—Strain No. 42 is popular in North Kolaba and during the year 3,430 lbs. of seed of this strain was distributed to registered seed growers sufficient to cover nearly 75 acres. The registered seed growers distributed about 28,000 lbs. of seed to cultivators in the tract.

50. *Rice seed multiplication.*—The seed of improved rices produced at the Karjat farm is always limited, the area under cultivation being only about 4 acres. So arrangements were made with the Trustees of the Jambul lands to grow pure rices under departmental control and about 7,000 lbs. of different rices were distributed from this centre. Similarly an area of about 10 acres of rice land near Karjat was given to the Agricultural Department by Government and this was sown under improved rices through a tenant. It is under consideration to utilise this area as a rice seed farm.

51. *Wheat*.—During the year strains Nos. 162 and 168 were compared in the Trans-Tapti talukas of West Khandesh and it was found that strain No. 168 is more suitable than No. 162. So arrangements were made to multiply seed of this strain on the Jalgaon farm and distribute it in that tract. Strain No. 224 was again compared in Erandol taluka of East Khandesh and found superior to the local. It has been arranged to distribute all available seed of all these strains from the Jalgaon farm in a concentrated area in the coming season, so that the purity of the seed can be controlled. Strains Nos. 808 and 809 were again tried during the year in the Nasik District and arrangements for multiplication of this seed were made.

52. *Akola Bajri*.—As reported in previous years, this bajri is doing well in Khandesh and during the year 19,300 lbs. of this seed was supplied from Nasik.

53. *Sugarcane*.—J. 213 variety is doing well in place of local Khadya and it is now covering nearly 300 acres in the District. This variety is affected by smut; so CO 290 and CO 213 which are free from smut are being tested for introducing them in place of J. 213. E.K. 28 and P.O.J. 2878 are being tried on the canal area to replace Pundia.

54. *Fertilisers*.—The use of fertilisers is getting popular day by day. The Imperial Chemical Industries Company have appointed propaganda officers in all Districts and they are working in collaboration with the departmental staff in arranging demonstration plots and explaining the uses of fertilisers for different crops. The Taluka Development Associations are working as distributing agents in several places for the Imperial Chemical Industrial Company and they distributed nearly 350 tons of sulphate of ammonia besides that distributed by private agents. The use of oil-cake as manure for irrigated crops is extending and during the year nearly 120 tons of cake were supplied through the Taluka Development Associations and Departmental staff.

55. During the year permits for 3,600 maunds of denaturalised salt mostly for Thana and Kolaba districts were issued by the Deputy Director of Agriculture.

56. *Sann as green manure for wheat*.—The dry wheat crop is usually grown without any manure: but since last 3 or 4 years sann as a green manure before wheat was demonstrated in Shahada and Nandurbar talukas of West Khandesh and it is gratifying to note that the practice of green manuring with sann has been successful and is finding favour with cultivators and during the year 36,000 lbs. of sann seed was distributed for green manuring of wheat crop in that area.

57. *Distribution of implements*.—During the year 75 ploughs were sold through the Taluka Development Associations while 14 sugarcane crushing mills were supplied through departmental agency. The District Agricultural Overseer, Palghar, assisted in procuring 8 Balsar rahats, 3 oil engines for pumping and 2 dusting guns for cultivators in his charge.

58. *Agricultural work in Dangs.*—The Kamgar in Dangs continued to work under the supervision of the Dangs Diwan and he put in 19 new embankments and repaired 205 old ones during the year. The embanked fields grow better kind of rice yielding 50 per cent. more than the local. Improved Nagli seed has been introduced and during the year he distributed nearly 800 lbs. of it. Two silos one at Ahwa and another at Chikhali were filled and demonstrated. He supervised the garden at Ahwa, where vegetable and fruit trees are grown for distribution in the area.

59. *Power Chaff-cutters.*—Two power chaff-cutters worked in the district one for 42 days and another for 44 days. They both together chaffed 46,000 bundles of jowar kadbi, weighing 270,210 lbs. The hire realised was Rs. 57-6-0 as against Rs. 21-8-0 of the last year.

60. *Implement depots.*—There were eight departmental implement depots and the total hire charges recovered during the year were Rs. 874-12-0.

61. *Crop protection measures.*—(a) Campaign against pigs. As in past years the Raver Taluka Development Association continued pig killing campaign for 6 months and killed 62 pigs at a cost of Rs. 126 on account of pay and ammunition.

(b) *Campaign against rats.*—There was rat trouble in Sindkheda and Shahada talukas of West Khandesh. A special campaign was undertaken in Sindkheda Taluka for killing rats with cyno gas and the work was concentrated at 4 places where 168 acres of wheat crop was saved from the rats. The use of cyno gas was demonstrated at 42 places in the taluka and leaflets describing details of treatment with cyno gas were distributed to the cultivators.

(c) *Sulphur dusting for mango-hoppers.*—During the year extensive demonstrations were conducted for sulphur dusting against mango-hoppers in Thana and Kolaba districts and in all 2,130 trees were dusted.

62. *Propaganda against smut.*—Special demonstrations of treating jowar seed with sulphur dust against smut were held at 415 places in Khandesh and 11,208 sulphur packets were distributed to the public. In Malegaon section of the Nasik District, the District Agricultural Overseer distributed 450 packets for this work.

63. *Use of bordeaux mixture against wilt in betel vines.*—The District Agricultural Overseer, Palghar, treated 6 plots at Mahim for this disease and advised the cultivators to grow vines under more hygienic conditions. The treatment gave good indications. This work is being extensively carried out at Bassein under the control of the Plant Pathologist.

64. *Horticulture.*—It is gratifying to note that the attention of people is being diverted to fruit culture more and more whenever there are facilities and means for such extension. The Horticultural Overseer in Khandesh budded and grafted nearly 900 fruit trees of different kinds such as bor trees, mangoes, chickoos, guavas, etc. The Agricultural Overseer at Erandol laid out 6 new plantations of santras and mosambis. The district staff in Thana and Kolaba arranged to bud nearly 500 bor trees.

65. *Ploughing competitions*.—Two 'ploughing competitions were organised under the auspices of the Dhulia Taluka Development Association at Kusumba and Ner which were witnessed by nearly 600 cultivators and prizes worth Rs. 33 were given to successful competitors. Rao Saheb B. R. Deshmukh, the District Deputy Collector of Dhulia, took keen interest to make the competition a success as it was a new innovation.

66. *Agricultural training—(a) Horticultural class at Bordi*.—This class was organised under the auspices of the Dahanu Taluka Development Association and was opened by Mr. M. D. Bhat, I.C.S., the Collector of Thana. The class was held for a week from 8th to 15th September 1932. There were 85 registered students who were examined at the end of the period when 68 students were declared successful. The class was conducted by the district staff of Konkan with the help of a demonstrator from the Horticulturist to Government.

(b) *Sugarcane class at Sakri*.—This was organised under the joint auspices of the Department and the Sakri Taluka Development Association for three days from 7th February 1933. It was opened by Mr. V. S. Bhide, I.C.S., the Collector of Dhulia. There were 54 students from Nasik, East and West Khandesh districts. Lectures and demonstrations in improved sugarcane cultivation, new varieties and gul making were given by the Departmental Staff.

(c) *Fieldmen's refresher's class at Jalgaon*.—This was organised departmentally at Jalgaon in May when 30 students from the Taluka Development Associations of the Division attended it. The class was opened by Mr. S. N. Chaudhari, the President of the Jalgaon Taluka Development Association, and was a great success.

(d) *Training in budding and grafting at Kalyan*.—With the help of the Horticultural Demonstrator training for budding and grafting was arranged at three places near Kalyan when many people took its advantage.

67. *Cattle improvement*.—There were 10 premium bulls in the non-breeding zone of this Division. The District Staff visited them periodically and gave advice for their proper upkeep. As mentioned in paragraph 35 above the cattle improvement work is making very good progress in the Division; and besides the cattle farms mentioned therein, the Sheth Morarji Velji Gowshala at Borivli is worth noting here. The Gowshala has a pure herd of gir cattle and is now managed as a business concern for milk supply under the superintendence of Mr. D. S. Patel, the late Inspector of Cattle Breeding at Chharodi and its successful working will serve as a very good object lesson to the several gowshalas round about Bombay.

68. *Betegaon Agricultural and Cattle Show*.—A District Agricultural and Cattle Show was organised under the joint auspices of the Bombay Gowrakshak Mandali and the Palghar, Umbergaon and Dahanu Taluka Development Associations. A central committee was formed under the presidentship of Mr. M. D. Bhat, I.C.S., the Collector of Thana and funds to the extent of Rs. 13,000 were collected from the different local

bodies and the public. The show was modelled on the lines of the Presidency Show at Poona and was formally opened on 5th March 1933 by the Honourable Sir Ghulam Hussain Hidayatullah, the Revenue and Finance Member of the Government of Bombay in the presence of a large number of leading gentry of Bombay and Thana District. The show was kept open for four days and nearly 40,000 people visited it. It was a great success and the organisers Mr. M. D. Bhat, I.C.S., the Collector of Thana, Mr. M. V. Shaikh, the District Deputy Collector, Mr. L. T. Gholap, I.C.S., the Assistant Collector and Mr. V. N. Shah deserve credit for the successful conduct of the show.

69. The District Staff arranged nearly 865 small shows and demonstrations on various agricultural subjects as scheduled below during the year :—

Serial No.	Nature of demonstration.	Number of places.	Attendance.
1	Crop demonstration	140	5,500
2	Ploughs and levellers	110	3,886
3	Power chaff-cutter	2	80
4	Jamabandi and Fairs	32	8,550
5	Cane crushing and gul making	10	1,225
6	Sulphur dusting for jowar and mangoes	500	12,000
7	Clyno gas treatment for rats	42	1,920
8	Cattle shows	2	1,300
9	Magic lantern shows	25	2,600
10	Plough competition	2	600

VI. Agricultural Education.

70. *The Vernacular Agricultural School at Dhulia.*—The total number of students during the year was 31, out of which 15 were in the first year and 16 in the second year. These boys when classified according to their caste stand as under :—

Marathas	19
Brahmins	4
Other Hindus	8
Total	31

71. The annual examination was conducted by Messrs. V. C. Pawate, the Inspector of Agricultural Schools and N. L. Desai, Superintendent, Jalgaon Farm. All the boys appeared in the examination and 13 out of 15 in the first year and 15 out of 16 in the second year came out successful.

72. The Local Agricultural School Committee continued to manage the contributions collected for the boarding of the boys as usual. During the year under report Rs. 2,285 were received from the local bodies of the Division. The Committee held five meetings during the year and has given valuable help in the management of the boarding affairs. Though the school was under the axe of the retrenchment, the Committee was successful in impressing Government the necessity of its retention which shows the keen interest taken by the Committee for the school. Out of 15 new admissions 4 boys joined the school at their own expense and the rest were given a monthly scholarship for their boarding at the rate of Rs. 5 per mensem as against Rs. 8 given last year.

73. There were 15 agricultural bias classes in the Division and the District staff helped in their working and conducting the examinations as usual.

74. *Agricultural education in the High School classes at Bordi.*—The High School continued to impart Agricultural education in the three lower standards in addition to their usual course, on the lines of the agricultural schools of the Department. These classes were visited from time to time by the local agricultural officers and it is worth mentioning that this innovation has proved to be a success.

VII. Miscellaneous.

75. *Dhulia Cotton Market.*—The market completed its second year on 31st August 1932. The total arrivals were 35,236 carts of seed cotton, 531 of lint and 61 of waste cotton. The total realisations were Rs. 6,952. As the headquarters of Mr. S. H. Prayag, Cotton Breeder, were transferred to Jalgaon, Mr. N. V. Bhagwat, Inspector of Agriculture, Dhulia, was nominated as a Government representative on the market committee. He attended all the meetings of the Committee and is keenly interesting himself in improving the working of the market. During the year there were 622 disputes of which 588 were settled by the market superintendent and 34 by the Dispute Sub-Committee.

76. *Publicity.*—The staff contributed 9 articles to *Shetki and Shetkari* and *Poona Agricultural College Magazine*. Besides notes on agricultural topics were contributed in the local newspapers. A leaflet on "Cotton manuring in Khandesh" was written and submitted for printing.

77. *Visit of the Honourable Minister of Agriculture.*—The Honourable Diwan Bahadur S. T. Kambli visited the Division in October 1932 when he paid visits to Nasik, Malegaon, Jalgaon, Bhusawal and Erandol Taluka Development Associations. The Taluka Development Associations of West Khandesh presented him a joint address at Dhulia. He opened the Gilligan Cattle Breeding Farm of the Jalgaon Taluka Development Association. He expressed satisfaction with the agricultural development in the Division and made useful suggestions for the better working of the Associations.

C. S. PATEL,

Deputy Director of Agriculture,
N. C. Division, Nasik.

APPENDIX A.

Statement showing information about the Taluka Development Associations in the North Central Division (amounts collected and main items of expenditure) for the year 1932-33.

Serial No.	Name of Taluka Development Association.	Amount collected.	Government subsidy.	Amount spent.					No. of plots arranged.	No. of Demonstrations held.
				Establishment and Office.	Implementments, etc.	Manures Seeds, etc.	Demonstrations.	Other Charges.		
	<i>Nasik District.</i>	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
1	Nasik ..	918	623	629	111	53	166	896	18	3
2	Kadwa Canal (Ozar) ..	2,160	724	966	..	..	300	584	15	1
3	Satana ..	3,645	774	1,547	1,151	239	121	701	75	7
4	Malegaon ..	2,056	702	1,181	506	87	113	288	37	18
5	Yeola ..	1,757	824	1,392	187	177	78	98	37	3
	<i>West Khandesh.</i>									
6	Dphula ..	2,815	1,000	2,038	553	..	161	913	38	35
7	Sakri ..	4,295	1,000	1,100	338	267	303	3,654	38	31
8	Sindhkheda ..	2,428	996	1,170	925	..	205	593	73	25
9	Shabada ..	629	754	988	4	282	232	234	186	30
10	Taloda ..	710	711	863	6	..	107	224	60	2
11	Nandurbar ..	670	1,000	914	154	..	349	503	18	51
12	Shirpur ..	1,759	991	1,147	608	..	12	477	70	39
	<i>East Khandesh.</i>									
13	Jalgaon ..	4,600	1,000	4,063	..	..	347	2,980	111	43
14	Bhusawal ..	3,017	1,000	1,795	295	..	130	747	49	100
15	Raver ..	2,123	1,000	2,023	65	151	137	549	67	41
16	Yawal ..	980	..	843	148	..	..	117	71	20
17	Idlabad ..	1,360	..	440	213	..	6	514	31	4
18	Amainer ..	1,034	486	545	145	..	78	214	45	30
19	Chalisgaon ..	1,735	1,000	1,194	105	..	202	1,046	38	25
20	Chopda ..	965	533	882	278	..	96	281	20	30
21	Krandol ..	1,585	680	724	139	..	174	176	10	19
22	Pachora ..	4,121	1,000	3,145	227	214	..	332	79	20
23	Parola ..	1,027	..	60	135	..	37	23	..	18
24	Jamner ..	344	..	430	..	..	..	2	..	15
	<i>Thana District.</i>									
25	Dahanu ..	204	615	373	498	25	87	125	8	3
26	Palghar ..	547	616	654	6	19	109	214	15	6
27	Umbergaon ..	143	159	277	..	..	50	15	..	..
28	Kalyan ..	Information not received.								
	<i>Kolaba District.</i>									
29	Mahad ..	399	..	355	..	25	..	4	25	1
30	Roha ..	161	252	663	..	11	4	..	2	1

PROGRAMME OF WORK UNDER THE DEPUTY DIRECTOR OF
AGRICULTURE, N. C. D., NASIK, FOR THE YEAR 1933-34.

- (1) Supervision and guidance of the Taluka Development Associations.
- (2) Cotton breeding work for wilt-resistance on Jalgaon Farm.
- (3) Jowar breeding work on Jalgaon Farm.
- (4) Selection work in groundnut on Jalgaon Farm.
- (5) Amelioration of the proteid contents of rice depleted due to the application of sulphate of ammonia as manure.
- (6) Amelioration of the lime contents of soils depleted due to the application of sulphate of ammonia as manure.
- (7) Studies of the suitable time and method of sulphate of ammonia as manure for rice.
- (8) Multiplication and organisation of the improved wheat strains.
- (9) Organisation of pure Banilla cotton seed supply.
- (10) Organisation of the seed supply of improved rice in Thana and Kolaba Districts.
- (11) Propaganda in the Girna Canal area for preseasonal sowing of cotton and use of sann as green manure for wheat, sugarcane, etc.
- (12) Propaganda against smut on jowar by using sulphur dust.
- (13) Propaganda to combat with menace of wingless grass-hoppers.
- (14) Propaganda against downy mildew on grape by the use of bordeaux mixture.
- (15) Propaganda against wilt in the betel vine in Bassein and Palghar talukas by the use of bordeaux mixture for disinfecting soils before planting.
- (16) Working of power chaff-cutters in Khandesh.
- (17) Working of the tractor in Khandesh.
- (18) Organisation of regulated cotton markets wherever possible.
- (19) Organisation of the Horticultural work in the Division.
- (20) Supervision and guidance of Agricultural schools and bias classes.
- (21) Propaganda in cattle improvement by way of issuing premium bulls, etc.
- (22) Encouragement of poultry farming wherever possible.
- (23) Introduction of improved sugarcane varieties and improved furnaces for gul making.

C. S. PATEL,

Deputy Director of Agriculture,
N. C. Division, Nasik.

APPENDIX D.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF
AGRICULTURE, SOUTH CENTRAL DIVISION, POONA, FOR
THE YEAR 1932-33.*Staff.*

Mr. V. V. Gadgil continued to hold the charge of the Division throughout the year under report. The Deputy Director of Agriculture, South Central Division, continues to be the nominee of Government to represent agriculture on the Local Advisory Committee of the G. I. P. Railway, Bombay. The Deputy Director of Agriculture, South Central Division, also continues to be a member of the Irrigation Conference.

The changes in the staff were as under :—

In October 1932, Mr. P. S. Kulkarni, B.Ag., who had the experience of farm work, was transferred for work at the Sugarcane Research Station, Padegaon, under the Principal Agricultural Officer, Sugarcane Research Scheme in Deccan; and Mr. N. S. Joshi, Graduate Assistant from that Station, was taken for district work and posted for work as District Agricultural Overseer, Kopargaon, on the Godavari Canals.

Mr. R. B. Shinde, B.Ag., District Agricultural Overseer, Satara, has been on long leave on medical certificate from September 1932 and during Mr. Shinde's absence on leave, Mr. S. B. Bhutkar, a senior Non-Graduate Assistant worked as District Agricultural Overseer, Satara, till 25th April 1933, when a graduate assistant, viz. Mr. H. C. Patil, B.Ag., was made available to take charge of the District Agricultural Overseer's post in the Satara District by his transfer from the post of District Agricultural Overseer, Poona. Mr. M. K. Shirole, B.Ag., was transferred from Pandharpur to work as District Agricultural Overseer, Poona, and a fresh graduate Mr. Gosavi, B.Ag., is appointed in his place.

In November 1932, Mr. R. D. Khandekar reverted to this Division from foreign service under the Shikshana Prasarak Mandal, Rajapur, and was posted for work on the Visapur Canal.

In January 1933 Mr. N. S. Joshi, District Agricultural Overseer, Godavari Canals, proceeded on leave on medical certificate for two months and during his absence on leave a fresh graduate Mr. D. H. Joshi, B.Ag., with some previous experience of work at the Padegaon Farm was appointed.

In February 1933, Mr. R. B. Ghatge, B.Ag., District Agricultural Overseer, Nagar, proceeded on leave for about two months; and was subsequently incapacitated by Medical Board, for further service from 13th April 1933. As a result, Mr. R. D. Khandekar was posted from Visapur Canals to work as District Agricultural Overseer, Ahmednagar, the new graduate assistant Mr. D. H. Joshi, B.Ag., being available for work on Visapur Canals.

The Deputy Director under instructions from the Director of Agriculture, Bombay Presidency, Poona, visited Nellikuppam Palur and other places in the Madras Presidency with a view to see the working

of the sugar-making apparatus and the process of manufacturing sugar and submitted proposals to have similar set of sugar-making for South Central Division. As a result, Government have recently sanctioned the purchase of one sugar-making set, at a cost not exceeding Rs. 7,500 for demonstrating the manufacture of sugar by the open pan process, on the Deccan Canals area.

Season.

In the Deccan, the season started rather late by the end of June 1932. Heavy rains were received in the second fortnight of July 1932 and the sowing of Kharif crops was begun by the end of July and in the beginning of August 1932. In the month of September, again heavy rains were recorded which were unfavourable to the Kharif crops which were full of weeds. Continuous rains were again received in October and November which postponed the sowing of Rabi crops. Bajri and cotton crops were spoiled by rain. The effect of heavy rains could be seen in the reduction of yield and the attack of Aphis on cotton, safflower and fodder crops. The sowing of rabi crops was finished by the end of October 1932, but in the middle of the Rabi season the climate was suddenly changed from moist to dry and the maturity of the crop was hastened. As a result the grain yield of Rabi jowar and wheat was affected. The total rainfall in different districts of the Deccan was as follows :—

Poona District.—Talegaon 30·1", Khed 28", Saswad 28·58", Indapur 28·50" and Baramati 29·31".

Ahmednagar District.—Nagar 33·58", Shevgaon 29·07", Shrigonda 28·63", Sangamner 30·50", Akola 40·60", Jamkhed 31·15", Belapur 41·87" and Kopergaon 26·91".

Sholapur District.—Sholapur 31·52", Barsi 32·44", Madha 34·47" and Malsiras 28·99".

Satara District.—Satara 62", Patan 97·59", Javali 83·81", Wai 41·55", Koregaon 45·83" and Khatav 26·71".

In the Ratnagiri District, ante-monsoon showers were received by the middle of May 1932 which were favourable for sowing rice in seed-bed areas. Regular monsoon commenced in the third week of June 1932; but it was insufficient and the sowing of sprouted rice (Rahu) had to be postponed till July. The transplanting of rice was also done late in the last week of July 1932. The late sowing was a great setback to rice. The sowing of Varakas crops like Nagali and Vari was also done late. In the month of August 1932, there was a break of 3 weeks and the crops began to wither. The rains in the month of September were quite adequate and useful. But the heavy rains of October resulted in the lodging of the rice crop and the grain of early rice was spoiled. The late rains also prolonged the sowing of rabi crops and the flowering of mangoes was delayed. The total rainfall at Ratnagiri was 101·72" as against 90" of the normal.

The effect of the season on different crops is given below.—In the Poona District, the season was favourable for fodder crops which have given normal outturn. Bajri crop was badly affected and was estimated at 8 annas. Potato crop in Khed and Junnar suffered very badly from the attack of Borers and rust and the yield of kharif crop was only 6 annas. The season, however, was favourable for rabi potatoes which were estimated at 10 annas. Groundnut, rabi jowar and wheat fared well and could be valued at 9 to 10 annas crops. Rice crop in Maval was normal but the grain was spoiled by late rains.

In Satara District, kharif crops yielded from 6 to 9 annas outturn and the rabi crops were estimated at 10 annas crop. Kumpta cotton was estimated at 7 to 8 annas, while groundnut, sugarcane and turmeric were valued from 10 to 12 annas crops.

In the Nagar District, Kharif crops yielded 6 to 8 annas outturn while rabi crops from 8 to 10 annas.

In Sholapur District the yield of dry cotton was very poor, viz. 6 to 7 annas, while bajri, groundnut, rabi jowar and wheat yielded from 8 to 10 annas crop. Sugarcane was satisfactory throughout.

In the Ratnagiri District, early rice was valued at 6 to 7 annas while late rice at 8 to 10 annas. Varkas crops yielded full normal crops.

In the canal tract, the yield of plant cane was almost normal but the adasali was much below the average, viz. 8 annas crop. Irrigated cotton yielded 8 to 9 annas crop while groundnut, rabi jowar and wheat gave 10 annas crop. Bajri crop was very poor, viz. 5 annas.

The slump in the prices.—The low prices for all agricultural commodities were prevalent throughout the whole year and the price of gul had gone to the lowest ebb, viz. Rs. 8 per palla of 250 lbs. It was, therefore, extremely difficult for the cultivators to realise even the cost of cultivation and majority of cultivators had to suffer huge losses. The money-lenders and the Co-operative Societies were unwilling to advance fresh loans and the crop did not produce usual outturn. The prices of fruit and vegetables were also very low as the purchasing power of the public decreased. On the canal tract Bhusar crop was not at all remunerative and its area is also much reduced. The Irrigators were only paying attention to sugarcane, cotton and groundnut. The general prices prevailing in this Division during the year under report are given below :—

- (1) Gul, Rs. 8 to Rs. 12 per palla of 250 lbs.
- (2) Seed-cotton, Rs. 35 to Rs. 40 per khandi of 500 lbs.
- (3) Groundnut, Rs. 18 to Rs. 20 per khandi of 500 lbs.
- (4) Bajri, 35 lbs. per rupee.
- (5) Jowar, 45 to 50 lbs. per rupee.
- (6) Wheat, 25 lbs. per rupee.
- (7) Paddy, 40 lbs. per rupee.
- (8) Nagali, 30 lbs. per rupee.

Lines of work.

The work of this Division is summarised under the following heads :—

- (I) Research.
- (II) Propaganda.
- (III) Agricultural organization—
 - (a) Taluka Development Associations.
 - (b) Non-credit Societies.
- (IV) Agricultural services—
 - (a) Engineering advice and assistance.
 - (b) Pig killing campaigns.
- (V) Agricultural Education.
- (VI) Miscellaneous.

Section I.**RESEARCH.**

Koparguon Farm.—The total rainfall during the year under report was 25·16" against the average of 19·41". The average yield of sugarcane per acre was 10,888 lbs. of gul for plant cane and 8,738 lbs. of gul for Ratoon cane as against 12,010 lbs. of gul for plant and 6,258 lbs. of Ratoon of the last year. The following experiments were conducted on this Farm :—

- (1) Trial of cane varieties.
- (2) Nitrogenous requirement of cane.
- (3) Improved method of planting cane.
- (4) Adasali cane cultivation.
- (5) Diversification in cane farming.
- (6) Miscellaneous experiments.

(1) In the trial of cane varieties, the following varieties were tried and their yields are given below :—

Plant cane.

(Yield per acre)

Name of variety.	Weight of cane in lbs.	Weight of gul in lbs.	Extraction.	Brix.	Gul to cane ratio.	Period of maturity	Remarks.
1	2	3	4	5	6	7	8
						Mts. ds.	
Striped D. 109 ..	88,288	10,625	69·0	20·2	12·0	12 7	
E. K. 28 ..	80,314	10,881	68·4	21·6	13·4	12 11	
P. O. J. 2878 ..	73,476	9,504	64·3	22·1	12·9	12 11	
Pundia ..	783,655	10,678	71·0	19·02	12·8	13 21	

Ratoon cane.

(Yield per acre)

Name of variety.	Weight of cane in lbs.	Weight of gul in lbs.	Extraction.	Brix.	Gul to cane ratio.	Period of maturity	Remarks.
1	2	3	4	5	6	7	8
						Mts. ds.	
Striped D. 109	66,929	7,504	68.25	19.35	11.2	11 7	
D. 109	88,560	9,160	67.8	18.75	10.8	11 1	
E. K. 28	80,931	10,710	66.27	21.7	18.2	11 21	
P. O. J. 2878	99,706	13,079	65.62	21.2	13.1	11 15	
Pundia	66,231	8,606	71.1	19.1	12.9	11 16	

The D. 109 variety has been dropped this year. This variety has been tried on this Farm from the year 1926-27 and the average of plant and ratoon for the last 6 years comes to 11,311 lbs. and 8,345 lbs. respectively as against 11,816 lbs. and 8,324 lbs. of Pundia. In the present varieties, the P. O. J. 2878 in ratoon has given best yields. Next comes the E. K. 28. The appearance of the Ratoon P. O. J. 2878 was very impressive and a great many cultivators who saw it, had appreciated this variety. There was a good demand for its seed but could not be met with owing to the limited supply.

(2) *Nitrogenous requirements of cane.*—This is the fourth year of this experiment which is tried on the local Pundia cane. The results of the four years are given below :—

Treatment.	1929-30.		1930-31.		1931-32.		1932-33.	
	Cane weight.	Gul weight.	Cane weight.	Gul weight.	Cane weight.	Gul weight.	Cane weight.	Gul weight.
<i>Plant cane.</i>								
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
100 lbs. N.	95,813	12,983	98,714	12,867	90,303	11,559	77,985	10,309
150 lbs. N.	102,656	13,837	104,808	12,532	102,034	12,874	85,131	11,011
200 lbs. N.	104,860	14,455	105,918	13,237	105,845	12,618	89,577	11,659
<i>Ratoon Cane.</i>								
100 lbs. N.	..	..	66,928	8,336	57,102	6,983	59,418	7,588
150 lbs. N.	..	..	82,492	10,280	55,629	6,621	72,261	9,114
200 lbs. N.	..	..	71,940	8,844	57,310	6,646	81,621	9,966

The following table shows the average yields for the four years :—

Treatment.	Plant cane.		Ratoon cane.		Remarks.
	Cane weight.	Gul weight.	Cane weight.	Gul weight.	
	Lbs.	Lbs.	Lbs.	Lbs.	
100 lbs. N. ..	90,704	11,920	60,816	7,636	
150 lbs. N. ..	98,657	12,564	65,144	8,672	
200 lbs. N. ..	101,550	13,005	70,290	8,485	

It will be seen from the averages that the cane weights in plant and ratoon show increase in the yield with the increase in doses. In gul weight, the Ratoon of 150 lbs. N. shows increase over 200 lbs. N. while in plant the progressive increase is marked. The economic value of the dose will be in favour of 150 lbs. N. but further trials are necessary to come to definite conclusions.

(3) *Improved method of planting cane.*—The trial of improved method (modified manjri farm system) versus local method of planting cane (mentioned on page 95 of the last year's report) was made at Kopargaon Farm for the past four years and their results are given below :—

Treatment.	Cane weight.	Gul weight.	Extraction.	Brix.	Gul to cane.	Age.
	Lbs.	Lbs.				Mts. ds.
		<i>Plant cane.</i>				
Improved method ..	92,062	11,815	71·7	19·15	12·7	13 25
Local method ..	106,568	13,126	70·5	19·5	12·2	13 29
		<i>Ratoon cane.</i>				
Improved method ..	48,962	6,164	69·8	19·6	12·8	11 15
Local method ..	62,434	8,020	67·8	19·48	12·85	11 6

The cost of cultivation in the Local Method is comparatively very high and the following figures show the cost of cultivation per acre and profit or loss :—

Plant cane.	Average yield per acre in lbs., 1932-33.	Average cost of cultivation.	Net profit or loss.	Ratoon cane.	Average yield per acre in lbs.	Average cost of cultivation.	Net profit or loss.
		Rs.	Rs.			Rs.	Rs.
Improved method ..	11,815	485	+ 61	Improved method ..	6,164	318	— 33
Local method ..	13,126	667	— 56	Local method ..	8,020	403	— 33

The rates of gul in this season have gone so low as Rs. 7 to 8 per palla for some time and the average rate obtained for farm gul was Rs. 11-9-0 per palla. This is the first time that the Improved method plot has sustained a loss in ratoon, though there is an improvement in yield.

The cost of cultivation.—This is much low this year. The following are the figures for costs of cultivation per acre in the two methods for the different years :—

Cost of cultivation per acre.

Year.	Improved method.				Local method.			
	Plant.		Ratoon.		Plant.		Ratoon.	
	Rs.	a. p.	Rs.	a. p.	Rs.	a. p.	Rs.	a. p.
1929-30	608	0 0	434	0 0	962	0 0	522	0 0
1930-31	531	0 0	374	0 0	763	0 0	464	0 0
1931-32	505	0 0	308	0 0	738	0 0	409	0 0
1932-33	485	0 0	318	0 0	668	0 0	403	0 0

(4) *Cultivation of Adasali Cane.*—The following are the results of this season. The cane was planted on 4th July 1931 and harvested periodically as given below :—

Yields of Adasali Crop per acre.

Weight of cane in lbs.	Weight of gul in lbs.	Brix.	Gul to cane.
(harvested in first fortnight of November 1932)			
90,226	10,640	14	11·9
(harvested in second fortnight of November 1932)			
104,228	9,712	14·47	9·4
(harvested in first fortnight of December 1932)			
102,485	10,183	15·08	9·9
(harvested in second fortnight of December 1932)			
101,600	9,952	14·9	9·8

The main reason of low yields is the field rat trouble. The trouble increased from October and the progressive damage also caused the progressive yields lower.

This is the third harvest of the Adasali cane crop and the results are given below :—

Year.				Average cane weight in lbs.	Average gul weight in lbs.
1930	..	..	..	119,856	11,975
1931	..	..	..	125,723	12,060
1932	..	..	..	99,635	10,122

The difference in the actual sale rates is also noteworthy.

Year.				Average sale rate of gul for Adasali per palla.	Average sale rate of gul for plant Ratoon per palla.
				Rs. a. p.	Rs. a. p.
1930-31	..	..	..	15 11 9	15 3 9
1931-32	..	..	..	17 6 6	15 3 6
1932-33	..	..	..	16 6 9	11 9 0

Prior to 1930 there were greater differences in the prices, the rate being very high for Adasali as compared with that for plant and ratoon canes. The rate fluctuation during the current year is also marked.

It is found that the Adasali cane lodges down heavily and in spite of high tonnage the yield is low due to low brix.

From this year, therefore, E. K. 28 and P. O. J. 2878 are being tried as Adasali canes. These varieties are erect and have got high brix. The results will be available during 1933-34.

(5) *Diversification in cane farming.*—The line and object of experiments are already cited in the previous year's report.

The following table shows the net profit or loss on main crop (sugar-cane) and the rotations observed in each series :—

I. Series.

Crop.		Gul yield per acre in lbs.	Cost of culti- vation.	Net profit or loss.
			Rs. a. p.	Rs. a. p.
Sann	..	23,646	29 0 0	} — 2 0 0
Cane	..	10,453	456 0 0	
Ratoon	..	7,702	318 0 0	
Bajri—				+38 0 0
Grain	..	1,292	} 70 0 0	—13 0 0
Fodder	..	2,708		
Gram	..	604	29 0 0	—10 0 0
Tobacco	..	560	75 0 0	+18 0 0

II. Series.

Crop.	Gul yield per acre in lbs.	Cost of culti- vation.	Net profit or loss.
		Rs. a. p.	Rs. a. p.
Sann	23,646	29 0 0	-16 0 0
Cane	10,130	456 0 0	
Ratoon	5,732	318 0 0	-53 0 0
Cotton	884	48 0 0	+10 0 0
Bajri—Grain	1,148	70 0 0	-14 0 0
Podder	2,568		
Gram	480	29 0 0	-14 0 0

The losses are chiefly due to the low rates but in spite of this, the two monetary crops inserted, viz. cotton and tobacco show profits. The results will be summarised next year.

(6) *Miscellaneous experiments*—(a) *Cotton*.—During the year the trial of Banilla with N. R. was continued. The following are the results for different years :—

Name of crop.	Yield per acre, seed cotton in lbs.		
	1930-31.	1931-32.	1932-33.
Banilla	528	533	852
N. R. cotton	413	501	862
B. XXI	429	514	796

The remarks of the Cotton Breeder on samples sent this year are given below :—

Banilla.—Cotton white lustrous, cotton from second picking slightly stained and leafy, staple 16-17 M.Ms., ginning percentage first picking 41·2, ginning percentage second picking, 40·0.

N.R. cotton.—Cotton white clean, staple 12 M.Ms. rough, ginning percentage first picking, 35·2; ginning percentage second picking 36·2.

B. XXI.—Cotton fine, lustrous, that of the second picking slightly stained, staple 20 M.Ms. ginning percentage first picking, 38·2, ginning percentage second picking, 37·5.

The summary of the remarks of the Cotton Breeder on cottons grown on this Farm is given below :—

Year.	N. R. Cotton.		B—XXI.		Banilla.	
	Staple length.	Ginning per cent.	Staple length.	Ginning per cent.	Staple length.	Ginning per cent.
1929-30	.. 12·14	35·37	..	..	..	..
1930-31	.. 14·15	40	18·19	40	16·17	41·3
1931-32	.. 12·14	35·36	18·20	40	15·16	42·5
1932-33	.. 12·0	35·36	20	37·38	16·17	40-41·2

In view of the superiority of Banilla cotton in yield it will be retained and other varieties dropped. Trials with different times of sowing cotton are being conducted.

(b) *Groundnut*.—Spanish Peanut groundnut is tried on this farm from the year 1929-30 and pure seed supplied to cultivators. The cultivators have a high opinion about the groundnut seed of this Farm.

The following are the figures of yields of different years and also those of analysis :—

Year.			Average yield per acre in lbs.	Per cent. of kernels.	Oil per cent.
1929-30	..	..	1918	72·22	50·40
1930-31	..	..	1869	80·34	48·30
1931-32	..	..	1892	79·50	50·12
1932-33	..	..	1853	80·0	48·40

Mohol plot.—This was a year of heavy rain. The total fall of rain was 33·69" while the average was 23·48". In the month of August 1932, 7·32" of rain was recorded. The season was favourable for cotton but Rabi, jowar suffered from sugary disease. The average yield of 35 acres of jowar was 350 lbs. of grain and 1,100 lbs. of fodder against 308 lbs. of grain and 1,014 lbs. of fodder of the last year per acre.

The following experiments were conducted on this plot :—

- (1) Dry farming experiments,
- (2) Trial of cotton,
- (3) Proper time of sowing jowar,
- (4) Interculturing of jowar,
- (5) Miscellaneous,
- (6) Jowar breeding.

1. *The dry farming experiments.*—The difference in the treatment was ploughing versus harrowing and it was compared with the cultivators' method. The average yields of five replications are given below :—

Treatment.	Drill used.	Outturn per acre.	
		Grain in lbs.	Fodder in lbs.
Ploughed	18"	628	2,714
Harrowed	18"	674	2,656
Cultivators' method	12"	700	2,922

The cultivator's plot contained, large number of plants and as the season was wet, all the plots got sufficient moisture and hence the yield was slightly higher but it is not significant.

2. *Trial of cotton.*—The trial of N. R. and Banilla cotton was conducted for the first time as a dry crop and the average yields of five replications are given below :—

Name of the variety.	Yield of kapas per acre.
	lbs.
(1) Banilla	468
(2) N. R.	384

From the results it will be seen that in years of good rainfall Banilla does better than N. R. and it is also valued higher for its better staple and ginning percentage. The experiment, however, requires confirmation.

3. *Proper time of sowing Jowar.*—An experiment was conducted to determine the proper time of sowing rabi jowar. The sowing was arranged at an interval of a week from 17th September 1932 to 8th October 1932 and the record of observations is given below :—

Factors.	Dates of sowings.			
	Uttara Nakshatra.		Hasta Nakshatra.	
	17th Sep- tember 1932.	24th Sep- tember 1932.	1st October 1932.	8th October 1932.
	Per cent.	Per cent.	Per cent.	Per cent.
Soil moisture	32	29	35	28
Air temperature—				
Minimum	89-3F	93-3F	93-8F	93-0F
Maximum	64-8F	67-1F	68-5F	65-5F
Soil temperature—				
8 A.M.	25-C	27 C	26-C	26-C
3 P.M.	29-C	31-C	32-C	30-C

		Dates of sowings.			
		Uttara Nakshatra.		Hasta Nakshatra.	
Factors.		17th September 1932.	24th September 1932.	1st October 1932.	8th October 1932.
		Per cent.	Per cent.	Per cent.	Per cent.
Germination	.. ..	77	66	78	55
Borer attack	.. ..	61	16	9	10
Number of plants	.. ..	38,240	32,960	40,000	27,440
Number of plants bearing ear-heads	.. ..	12,240	16,840	20,880	7,200
Yield of grain	.. ..	lbs. 322	lbs. 434	lbs. 360	lbs. 153
Yield of fodder	.. ..	1,440	1,440	1,283	560

The sowing on 24th September 1932 appears more advantageous, but further trials are necessary to come to conclusions.

4. *Interculturing to Jowar.*—This season being of abnormal rainfall, the value of interculture is naturally adversely proved. The results are tabulated below :—

		Yield per acre.	
Treatment.		Grain lbs.	Fodder lbs.
(a) Interculture	.. ..	236	1,008
(b) Inter-ploughed	.. ..	216	1,140
(c) Non-interculture..	.. ..	252	932

5. *Miscellaneous experiments.*—(a) Sulphur dusting of jowar seed to prevent smut was continued. This was a wet year when smut has appeared in a virulent form. But it is interesting to note that not a single smutted ear-head appeared on the farm when the surrounding fields were full of smut.

(b) Trial of improved versus local seed-drill was continued and the observations in regard to the depth of the seed deposited, draft, hitching point, etc. were recorded. Out of the three seed-drills the new model was found to be superior in point of less draft and weight than Mr. Schutte's seed-drill. It also deposited seed at regular distance than the country drill.

(c) *The land erosion*.—The plots under observation gave the following yields of rabi jowar :—

	Yield per acre.	
	Grain lbs.	Karbi lbs.
(1) Unwashed	379	1,826
(2) Washed	281	1,096

(6) *Jowar Breeding.*

1. *Maldandi variety*.—The study of the types isolated during the year 1930-31 in Maldandi jowar has again confirmed that the long internode types grow faster and are earlier in flowering and ripening than the short internode types. Four selections in the long internode types have yielded higher than the ordinary Maldandi check and also possess superior grain. It is decided to try the best strain No. 35-1 and 47-3 in Sholapur and Bijapur Districts during the next season.

2. *Tamdi-Jogdi variety*.—Three high yielding selections, viz. B-8-5, T.K. 6 and T.K. 18 have been obtained and they will be tried on replicated tests with the local Tambadi Jogdi check.

3. *Nagar Dagdi variety*.—The promising strains N.D. 8 and N.D. 15 of the last year were again tested on a large scale this year. N.D. 15 has given 32 per cent. more yield and N.D. 8, 26 per cent. more yield than the Nagar-Dagadi local. These strains were also grown at Mirajgaon in Nagar district on three acres each along with local jowar and it was found that N.D. 15 gave 37 per cent. more grain and 34 per cent. more fodder over the local jowar. It has been decided to try this strain in six villages in the Nagar District.

4. *Bijapur Dagdi*.—The strain Nos. B.D. 34 and B.D. 29 were tried at Mohol Farm and have given higher yields. These were also tried at Bagalkot and the results are encouraging. The strain No. B.D. 29 is much appreciated for the shape, compactness and bigger grain.

5. *Karad and Koregaon (Satara District) varieties*.—Three varieties of rabi-jowar, viz. Dagadi shalu, Bedri and Guldevi were grown on Mohol farm as they are well known for better quality of grain. They contained a good deal of mixture. Selections were made to evolve a big grained variety.

RATNAGIRI FARM.

The work of this Farm is described under the following sub-heads :—

- (1) Rice breeding and selections at Ratnagiri and Sakharpa.
- (2) Nagali work at Hatkamba Sub-Station.
- (3) Sugarcane work.
- (4) Pine-apple work.
- (5) Miscellaneous.

1. *Rice breeding and selections.*—The work mentioned on page 176 of the last year's report was continued during the current year. The seeds of improved strains, viz. Patni No. 6 and Kudai No. 25 were propagated on the farm and 1,400 lbs. of pure Patani No. 6 and 520 lbs. of Kudai No. 25 were supplied to the registered Seed growers.

Among the intermediate strains, Panwel No. 61 and Waksal No. 207 were tried in eight replications; but both of them have given equal yields. During this year 2,530 lbs. of Panwel No. 61 and 1,500 lbs. of Waksal No. 207 were supplied to seed-growers.

Bhadas No. 79 was tested with Local Bhadas in six replications and it has given significant increase of 18·8 per cent. over the local. This will be tried in village trials next year.

Among the late strains, Varangal Nos. 420, 448 and 487 were tried at Sakharpa in five replications along with local Varangal and the strain Nos. 420 and 487 have given 24 and 19 per cent. more yield. The results will be confirmed next season.

Out of the crosses between Kolamba No. 79 and Patni No. 6, the seeds were sown in F. 1 generation and some high yielding strains with desired characters have been selected.

2. *Nagli work at Hatkamba Sub-station.*—The main work done at the Hatkamba Sub-station was the multiplication of Nagali strains, viz. A. 16, B. 11, E. 31 and E. 82 and E. 44. Pure seeds of different strains were produced by bagging the ear-heads. The total quantity of Nagali strains available for distribution was 4,400 lbs.

Manurial experiments with Nicifos, Fish manure and a mixture of Sulphate of Ammonia and Bone-meal were arranged in four replications with no manure plots, both with A. 16 and B. 11 strains and the average yields under different treatments are given below:—

Treatment per acre.	Average.	Yield per acre.
	A 16 lbs.	B 11 lbs.
(1) Mixture of Sulphate of Ammonia 80 lbs. and 120 lbs. of Bone-meal	1,434	1,320
(2) Nicifos 100 lbs.	1,168	1,240
(3) Fish manure 320 lbs.	1,034	1,040
(4) No manure	908	741

It can safely be said that the mixture is more advantageous over any other treatment and it is gratifying to note that people have begun to adopt this mixture for Nagali crop.

3. *Sugarcane*.—The following sugarcane varieties were tried on small scale to ascertain their yields. Most of the crop was distributed for seed purpose. The yields are given below :—

Name of the variety.						Yield of cane per acre.	Brix.
						lbs.	
H. M. 87	..	..	..	..	..	78,796	20
H. M. 89	..	..	..	..	..	60,622	21
H. M. 544	..	..	..	..	..	62,026	18
Red Mauritius	..	..	..	..	..	73,625	17.5

H.M. 87 has been found continuously high yielder but the crop was attacked by wild cats and hence there is not much possibility to develop the area under cane in Konkan.

4. *Pine apple*.—The plantation of Ceylon varieties Que and Queen Pine Apples at Ratnagiri Farm, is producing excellent fruit. The demand for their fruit and suckers is rapidly increasing as there is good scope for extension of this crop. The outturn from a plot of 10 gunthas of pine-apple was 1,530 lbs. of fruit, i.e. 6,120 lbs. per acre and the weight of each fruit varied from 8 to 12 lbs.

5. *Miscellaneous experiments*.—(a) The mango grafts from Raigad are now well developed both at Ratnagiri and Hatkamba and will bear fruit in a few years. The dusting of mangoes has now taken a firm root.

(b) The trial of tobacco as a rain fed crop in the semi-kharif season was done at Ratnagiri and Hatkamba. The seedlings of Nadiad No. 28 and the Pusa variety were raised and supplied to various cultivators. The yield varied from 800 to 960 lbs. of cured Tobacco of milder type.

3. *Groundnut*.—Small Japan and Spanish peanut were successfully grown in the low-lying fields as a rabi crop after rice crop was harvested and the yield varied from 900 to 1,200 lbs. per acre. This crop will replace Kulthi or Wal which fetch very low price.

4. Trial of Nicifos to rice crop was conducted with the help of the Imperial Chemical Industries Limited. The manure was applied to rice (Patni No. 6) in two doses and the results are given below :—

Treatment per acre.	Mean yield per acre.		Percentage increase over local.	
	Grain lbs.	Straw lbs.	Grain lbs.	Straw lbs.
(1) Nicifos 100 lbs. ..	1,437	2,390	9	13
(2) Local check (no manure, ..	1,321	2,115	..	..
(3) Nicifos 150 lbs. ..	1,702	2,739	36	27
(4) Local check (no manure) ..	1,249	2,145	..	..

These experiments are worth repeating.

Section II.

PROPAGANDA.

The principal items of propaganda are given below :—

1. *Treatment of jowar seed against smut.*—As mentioned in the last year's report the old method of treating jowar in copper sulphate solution was discontinued and the cheap treatment of mixing the seed with sulphur dust was adopted on a large scale. The following number of packets were distributed during this year :—

Name of the District.	No. of packets distributed.
(1) Poona	519
(2) Nagar	568
(3) Sholapur	2,418
(4) Satara	1,500
(5) Canal tract	2,447
Total ..	7,452

Thus, during this year, 3,87,120 lbs. of jowar seed was actually mixed with sulphur dust and it was sown over an area of 48,390 acres. There was hardly any smutted earhead in the treated area ; while in the untreated area, the percentage of smut varied from 3 to 14 per cent.

2. *Introduction of new crops and varieties.*—As mentioned on page 100 of the last year's report, the introduction of E.K. 28 and P.O.J. 2878 varieties of cane was made as these varieties contained higher sucrose and are early in ripening. They also require less water and manure than the local Pundya cane. During the year under report, 6,66,595 sets of E.K. 28 and 3,02,470 sets of P.O.J. 2878, 2,000 sets of Co. 290 and 5,000 sets of H.M. 89 were supplied to the cultivators. Co. 290 thrives well in low-lying situation while H.M. 89 is an early variety, non-arrowing and erect. The area under these varieties are as follows during the current year :—

E.K. 28	150 acres.
Co. 290	10 „
P.O.J. 2878	50 „
H.M. 89	5 „

Besides, the Belapur Company, Saswad Mali Sugar Factory, the Maharashtra Sugar Factory and Shet Walchand Sugar Factory have got large areas under E.K. 28 and P.O.J. 2878 and the total area may exceed 4,000 acres. In addition to these varieties, H.M. 320 and the new sorghum cane hybrids have been tried at Belvandi and Belapur and some of these are very promising.

3. *Introduction of Banilla cotton.*—It has now been definitely found that Banilla cotton brings more return than N.R. as an irrigated cotton on the Deccan Canals. Banilla kapas fetches Rs. 15 more per khandi of 500 lbs. than N.R. as it is superior in ginning percentage and staple. The comparative results of the two varieties for the past six years are given below :—

Year.			Yield of seed cotton per acre in lbs.	
			N.R.	Banilla.
1927-28	..	..	1,025	976
1928-29	..	..	1,316	1,025
1929-30	..	..	1,266	1,300
1930-31	..	..	1,198	1,303
1931-32	..	..	765	892
1932-33	..	..	663	774
Average ..			1,039	1,045

The ginning percentage of Banilla varies from 38 to 42 per cent. while N.R. gins 36 to 37 per cent. The staple of Banilla is 17 m.m. while of N.R. is only 12 m.m. During this season, 4,156 lbs. of Banilla seed has been distributed on the Deccan Canals.

Banilla and N.R. cottons were also tried under well irrigation in the Sholapur District and the comparative yields are given below :—

Average yield of kapas per acre.			
			Lbs.
Banilla	..	..	1,080
N.R.	..	..	960
Local mixture	..	..	360

During the current year, 5,000 lbs. of Banilla seed is distributed in Sholapur District.

Experiments with artificial manures on cotton, mentioned on page 101 of the last year's report, were also conducted this year and the results are given below :—

Treatment per acre.		Yield of kapas per acre.
(In perennial block after sugarcane.)		
		Lbs.
(1)	25 lbs. of N. from sulphate of ammonia	957
(2)	25 lbs. of N. from Nitrate of Soda ..	995
(3)	Control (no manure)	692
(In eight months' block.)		
(1)	20 lbs. of N. in sulphate of ammonia 15 lbs. of N. in oil cake. ..	559
(2)	20 lbs. of N. in Nitrate of soda 15 lbs. of N. in oil cake	662
(3)	Control (no manure)	424

The season was not favourable for cotton crop ; hence, the yields are low when compared with last year's results. However, the cotton crop has responded well to the treatment and the conclusions of the last year, viz. the superiority of the Nitrate of Soda over Sulphate of Ammonia, have been confirmed.

4. *Introduction of groundnut.*—The Spanish peanut variety of groundnut is introduced on the Deccan Canals for the last five years and it has taken a firm root on the light and medium black soils. Most of the cultivators preserve their own seed. During the year under report, 17,357 lbs. of seed is again distributed. The area under peanut is increasing on the Godavari and Pravara Canals where the trouble of pigs is minimised. On the Nira Right Bank Canal and in the dry tract of the Poona District, very good yields of peanut, varying from 1,200 to 1,700 lbs. of nuts per acre, are recorded as the season was favourable for groundnut and the area is sure to increase next year.

The application of 200 lbs. of super-phosphate to Spanish peanut per acre was continued this year with the following results :—

	Yield per acre.
200 lbs. of super-phosphate ..	1,345 lbs. of nuts.
No manure ..	1,031 lbs. of nuts.

5. *Akola Bajri.*—The distribution of Akola bajri has become one of the routine works of this division as Akola bajri is still considered to be heavy yielder over the local bajri. During this year, 6,558 lbs. of bajri seed was supplied to the cultivators. But the crop was somewhat spoiled by continuous heavy rains in September.

6. *Pusa Wheat.*—Pusa No. 4 variety of wheat is gradually extending in this Division as it is a rust resistant and better yielder. The total area under this wheat is over 1,500 acres mostly in Poona, Nagar and Canal tract. During the year, 7,975 lbs. of Pusa No. 4 was distributed. The season was favourable for wheat crop and the comparative yields are given below :—

	Yield per acre.
	Lbs.
Sholapur District .. Pusa No. 4 ..	675
Local wheat ..	590
Nagar District .. Pusa No. 4 ..	450
Local wheat ..	300
Canal tract .. Pusa No. 4 ..	560
Local Baxi ..	354

The difference in the yield is more marked as the local wheat suffered from rust.

7. *Tobacco*.—Gandio No. 6 was tried in Sholapur District with the local tobacco and it gave 25 per cent. more yield. The actual yields are given below :—

	Yield per acre.
Gandio No. 6..	610 lbs. of cured tobacco.
Local ..	450 lbs. of cured tobacco.

In the Nagar District, wide sowing of tobacco was introduced in seven centres of the Sangamner and Akola Talukas and the increased yield in $2\frac{1}{2}$ feet method over the local method of $1\frac{1}{2}$ feet varied from 271 to 474 lbs. of cured tobacco per acre. The advantages of wide sowing are now known to the public.

In the Ratnagiri District, Nadiad No. 28 variety of tobacco was tried in twenty-five places as a semi-kharif crop and the results are encouraging. This crop can be raised on rain on soils which grow uneconomic crop like Nagali or Vari. The process of curing was also successful although the product was somewhat milder. The Tobacco Breeder, Nadiad, thinks that this tobacco will be useful for cigarettes.

8. *Potato crop*.—Manurial experiments on potatoes were conducted on the Deccan Canals and also in the Sangamner Taluka. The combination of artificial manure recommended by Dr. Mann in his bulletin has increased the yield by 2,220 lbs. and 3,200 lbs. over the local check. In Satara District, 12,360 lbs. of Italian potatoes were supplied in the rabi season and the demand is steadily increasing.

9. *Trial of Berseem*.—On the Deccan Canals, Berseem was tried for fodder, as well as for soil improvements. The total yield varied from 18,000 to 36,800 lbs. of green fodder per acre. The effect of Berseem on soil will be observed next year.

10. *Improvements in sugarcane cultivation*.—The methods of improvements mentioned on page 102 of the last year's report were further advocated but marked progress was seen in the reduction of top-dressing manures from 250 lbs. of N. to 150 lbs. of N. in plant cane and from 350 lbs. of N. to 225 lbs. of N. in Adasali cane. On account of very low prices of gul, the cultivators are forced to adopt economical dose. The second improvement was the adoption of sann green manuring on a large scale to reduce the cost of bulky manure. During the year, 84,876 lbs. of sann seed was distributed, out of which, 12,400 lbs. of sann seed was supplied free of cost to the Nira Right Bank Canal. The Irrigation Department has granted special concession of free water to Sann crop till 15th February 1934 and this concession was very much appreciated by all the cultivators. The green manuring is not only useful for sugarcane crop but it increases the yield of rabi jowar and wheat by 50 per cent. Sann thrives well on any soil, except stiff black and if the rainfall is favourable about 40,000 lbs. of sann crop can be raised on an acre of land. Green manuring of sann supplies sufficient plant food, prevents water-logging and salt incrustation, maintains the texture of the soil and kills the weeds to some extent. People should adopt this method on a still wider scale.

11. *Introduction of improved strains of rice.*—As mentioned on pages 181 and 182 of the last year's report, a system of seed multiplication with the help of Registered Seed Growers is going on for the last three years. During this year, 7,000 lbs. of Panwel No. 61, Kolamba No. 79, 184 and 401 and Kudai No. 25 were supplied to the Registered Seed Growers of Ratnagiri District for an area of 150 acres. The normal yield of these strains was over 250,000 lbs., but the seed was so much spoiled by rain that hardly 40,000 lbs. of seed was available for distribution to the general public. This seed was sufficient only for 800 acres.

12. *Introduction of Improved Nagali strains.*—The work mentioned on pages 182 and 183 of the last year's report was further continued. During this year, 2,000 lbs. of the seed of the improved strains was supplied to Registered Seed Growers for an area of 250 acres. But the crop in Devgad and Malvan Talukas was spoiled by rain. Only 8,000 lbs. of seed was available for distribution and it was sufficient for 800 acres in the current year.

13. *Dry farming.*—The work mentioned on page 103 of the last year's report was conducted more vigorously and in all 61 plots in Nagar District, 19 plots in Sholapur District and 13 plots in Satara District and a very large area in Poona District, were treated with the principles of dry farming. The area in Shirur Peta and Indapur Taluka, under dry farming method, has now exceeded 2,000 acres. Although the season was not favourable for dry farming, due to abnormal rain, there was a marked difference in the yield of the comparative plots, which are given below :—

In Sholapur District.

Dry farming plot yielded 500 lbs. of grain, 880 lbs. of Kadbi.

Local plot yielded 450 lbs. of grain, 800 lbs. of Kadbi.

In Nagar District.

Dry farming plot yielded 490 lbs. of grain, 1,677 lbs. of Kadbi.

Local plot yielded 374 lbs. of grain, 1,553 lbs. of Kadbi.

In Satara District.

Dry farming plot yielded 1,020 lbs. of grain, 2,400 lbs. of Kadbi.

Local plot yielded 820 lbs. of grain, 2,600 lbs. of Kadbi.

14. *Seed grading.*—The importance of selecting seed by means of sieves is now known to the cultivators and this propaganda was carried on a large scale. The selected seed generally increases the yield by 10 to 15 per cent. over the un-selected one. During this year, the following quantities of seed were graded :—

In Poona District, 137,760 lbs. of Jowar ; 50,400 lbs. of Bajri ; 26,960 lbs. of wheat.

In Sholapur District, 181,600 lbs. of Jowar ; 30,500 lbs. of groundnut.

In Satara District, 54,310 lbs. of jowar ; 19,448 lbs. of Bajri.

In Nagar District, 60,000 lbs. of jowar.

All the seed was sufficient to cover 85,000 acres. The grading of jowar and bajri has become a common practice, but grading the groundnut seed is also appreciated in Sholapur District and it is presumed that it will be adopted in Satara District where the area under groundnut is extensive.

15. *The Soaking Compartments at Belwandi.*—The work mentioned on page 103 of the last year's report was continued. The catchment area is not sufficient to soak all the compartments ; hence, the last two blocks were allowed to be sown with Spanish peanut. The compartments were flooded twice in the season—once in August and the second time in September after the jowar crop was sown. It affected the germination to some extent, but the soaked portion gave 55 per cent. more outturn than the check plot. The yields are given below :—

Treatment	Yield per acre		Increase percentage	
	Grain	Fodder	Grain	Fodder
	Lbs.	Lbs.	Per cent.	Per cent.
Soaked compartments	357	818	55	36
Check plot	230	600	....	....

From the results of the last 5 years it will be seen that the land is not in any way deteriorated on account of the continuous cropping of jowar year after year.

16. *The Boshi Cultivation (Sind Method of Flooding).*—This experiment, mentioned on page 104 of the last year's report, was again repeated at Pimpri and the following yields are recorded :—

Treatment	Yield per acre		Increase percentage	
	Grain	Fodder	Grain	Fodder
	Lbs.	Lbs.	Per cent.	Per cent.
Boshi method	836	1,737	153	131
Check plot	330	750	....	....

Both the experiments of soaking and flooding the land are worth adopting as they ensure success of the crop in a precarious tract of Ahmednagar District.

17. *Implement Depots.*—Now almost all the Taluka Development Associations have maintained implement depots for the benefit of cultivators and they have become a source of income to these Institutions. The Department has still maintained 20 Implement Depots and the total hire collected during the year was Rs. 667-8-0. The policy of the Department is to entrust this work to private bodies and individuals who can run this work on business lines.

18. *Crop Pests and Diseases.*—A campaign against Tambera (rust) disease of potatoes was undertaken in Purandar and Khed Talukas of the Poona District and about 105 acres of the crop was treated with lime and sulphur. More than 1,500 lbs. of sulphur dust was consumed and the cultivators were charged at rupee one per acre for the materials. Some cultivators purchased dusting guns for dusting the crop. In Purandar and Baramati Talukas the grapes were sprayed with Bordeaux mixture for Downy Mildew and Arthrocnemum and also dusted with sulphur for Powdery Mildew. The attack of Aphis on Lucerne, cabbage and other vegetables was checked by spraying with crude oil emulsion.

On account of abnormal rain, mosambi plants were badly affected by Gumoses. About 4,000 plants were treated this year with carbolic acid and creosote paint with great success. Similarly, about 800 fig trees were treated with sulphur for rust but the treatment was not so effective.

In seven villages of Purandar Taluka, Mildew on peas was treated with Sulphur dust and about 20 acres of peas were successfully cured.

In the Ratnagiri District, spraying against Koleroga of Betelnut was conducted and nearly 75 acres of supari garden were sprayed with Bordeaux mixture.

19. *Eradication of Prickly Pear.*—In the extension area of the Sholapur City, the Revenue Department was anxious to eradicate 8 acres and 6 gunthas of prickly pear within 3 months and a grant of Rs. 850 was given to undertake this work. The following four methods were adopted to execute the work :—

- (1) Cutting, up-rooting and burning.
- (2) Spraying with Arsenic Pentoxide and Sulphuric acid.
- (3) Injecting poison in the stumps, and
- (4) Infesting the crop with Cochineal insects.

It was found that the first two methods were tedious and costly while the third method was very sure of success. The infection with insects was very easy, less costly and most efficacious, although it takes more time. Cochineal insects have now been introduced in Poona, Satara and Nagar Districts and its effect will be seen in the destruction of the vast area of prickly pear. The District Local Board of Satara has introduced these insects in 60 villages.

20. *Campaign against rats.*—During this year there was a serious trouble of field rats to sugarcane crops, especially to Adasali Cane. The rats make burrows in the fields and cut the roots of cane crop. It was, therefore, necessary to kill them by fumigating the burrows with white arsenic and also with Sulphur fumes. Special fumigating pumps were prepared by the Mechanical Assistant and these were found very effective in destroying the rats. About 12 cultivators have adopted this method and the effect of this fumigation will be watched.

21. *Fruit and Vegetable.*—The attention of cultivators is devoted to the cultivation of fruit trees where the prices of other commodities have gone down. On the canal tract, the plantation of orange and mosambique is increasing while in Sholapur and Satara plantains (Basarai) are grown on a very large scale. In Satara District a special nursery has been started and 11,000 plantain suckers, 3,100 orange plants, 300 grafted mangoes and about 4,700 other fruit trees were supplied to the public. At Ratnagiri and Chiplun, nurseries for raising vegetable seedlings are arranged and seeds worth Rs. 150 and 25,000 seedlings of Tomatoes, bringels, chillies, cabbage and knolkol were supplied. Now such vegetables are grown locally and the import from Ghat is very much decreased.

22. *Dusting of mangoes.*—This remedy is now known to all the cultivators of Ratnagiri District. About 10 tons of Sulphur dust was consumed during this year. In all about 10,000 grafts were dusted. 75 dust guns are now working in the Ratnagiri District.

The trial of the Power Duster was arranged at Vengurla and 30 big mango grafts were sprayed. Side by side some mangoes were dusted with hand duster for comparison. There was no difference in bearing of fruit. But the cost of dusting with power duster was high as it requires more power.

23. *Grading of Mangoes.*—The work mentioned on page 185 of the last year's report was further continued. At Ratnagiri 1,500 mango baskets were graded under the supervision of the Overseer while at Malvan and Vengurla 2,500 baskets were graded through the Co-operative Sale Societies. As a result of the last three years' work, the dealers are now convinced of the advantage of grading the fruit. The difference between the prices of graded *versus* ungraded baskets was from Rs. 2 to Rs. 3 per basket in favour of the former in Bombay market.

The Taluka Development Association, Ratnagiri, advertised the advantages of ordering graded mangoes at reasonable rate, and as a result, several orders were received from Madras and United Provinces. Mr. Gilligan, I.C.S., the Collector of Ratnagiri, took very keen interest in this business.

During this year the B. S. N. Company reduced the steamer freight on mango baskets by as. 2, as a result of the pressing demand of the Mango Sale Societies.

24. *Canning of mango pulp and slices.*—On account of late bearing of fruit, people were anxious to can the mango pulp and have placed orders for 5,000 sanitary cans. But with great difficulty only 1,000 cans were supplied by the Horticulturist to Government and they were filled with mango juice. An order for two seaming machines has been placed for the next season.

25. *Sugar Making by Open Pan Process.*—On account of the low prices of gul the attention of the cane-growers was directed to sugar making by open pan process. On the Pravara Canals, four cultivators tried this experiment on a large scale; one of them prepared the rab by Ehopal Bel while the other three prepared it by the Poona Multiple Furnaces. The average recovery of the first sugar varied from 5 to 5.50 per cent. while the second sugar came to 1.25 to 1.75 per cent. from the Pundya cane. The manufacturing cost of preparing sugar varied from Rs. 2-4-0 to Rs. 3-0-0 per Bengal maund of sugar and if the price of 14 maunds of cane required for preparing one maund of sugar be added to this cost at as. 7 per maund of cane, the total manufacturing cost comes to Rs. 8-6-0 to Rs. 9-2-0. The sugar was sold at Rs. 10 per maund. If the average yield of cane be calculated at 35 tons per acre, the margin of profit varies from Rs. 115 to Rs. 61 per acre. If they had prepared gul, they could have got 35 pallas of gul, fetching only Rs. 367 at the rate of Rs. 10-8-0 per Palla, and would have suffered a loss of Rs. 35 to Rs. 85 in manufacturing gul.

Some cultivators prepared only first sugar from the rab and the first molasses were converted into gul by adding a fresh juice to improve the quality. This gul fetched half the price when compared with the price of the best quality of gul and this was a profitable bargain as they could utilise all the molasses. When second sugar is prepared, they are required to throw the second molasses and the quality of the second sugar is also inferior. Since these trials were conducted attention of several cultivators is now directed to sugar making by the open pan process and the Department is required to issue special leaflet and the working scheme for the information of the public. The Bombay Provincial Co-operative Bank has decided to erect two sets of the apparatus for manufacturing white sugar by the open pan system and the Government of Bombay have also sanctioned Rs. 7,500 to instal a third set to compare the results.

26. *Sugar factories.*—The last year's visit of the Deccan cultivators to some sugar factories in U. P. and Bihar (mentioned on pages 108 and 109 of the last year's report) proved very fruitful and on account of the depression of gul market, several enterprising cultivators are trying their

best to erect up to date sugar factories in the Deccan. During the current year, the following factories are under construction and their actual working will be started in 1933-34 :—

- (1) The Saswad Mali Sugar Factory Ltd. at Akaluja, on the Nira Right Bank Canal; capacity 250 tons of cane crushed per day. It has purchased sugar machinery of Messrs. Fawcett Preston & Co. of Liverpool, England.
- (2) The Phaltan Sugar Factory at Pimpalwadi in the Phaltan State, on the Nira Right Bank Canal; capacity 400 tons of cane crushed per day. It has purchased sugar machinery of Messrs. Duncan Stewart & Co. of Glasgow.
- (3) Messrs. Marsland Price & Co. Ltd., Kalam, District Poona, on the Nira Left Bank Canal; capacity 150 to 200 tons of cane crushed per day. It has purchased sugar machinery of Messrs. Fried Krupp Ltd. of Germany.
- (4) The Maharashtra Sugar Mills Ltd. at Belwandi on the Visapur Canal; capacity 150 to 200 tons of cane crushed per day. It has purchased sugar machinery of Messrs. Fried Krupp Ltd. of Germany.
- (5) The Ravalgaon Sugar Factory Ltd., Post Ravalgaon, District Nasik, on the Girna Canal of the Nasik district. Capacity 150 tons of cane per day. It has purchased sugar machinery of Messrs. Duncan Stewart & Co. of Glasgow.
- (6) The Kolhapur Sugar Mills Ltd. at Kolhapur (S.M.C.); capacity 350 tons of cane crushed per day. It has purchased sugar machinery of Messrs. Fawcett Preston & Co. of Liverpool, England.

Each of these factories have got their sugarcane area and all of them are concentrating their attention on the cultivation of the new varieties, viz. E.K. 28, P.O.J. 2878, Co. 290, H.M. 320 etc.

The old well-established sugar factory of the Belapur Co. Ltd. has made splendid progress, both in the cultivation of the new varieties and also in the manufacture of sugar. It has secured the highest percentage of recovery, viz. 11·28, for the whole of the season and this is the record yield in the whole of India. The present capacity of this factory is about 450 tons of cane crushed per day, but the company is trying to increase its output by extending its sugarcane area and by the addition of some machinery. There are several inquiries for starting sugar factories on the Nira Right Bank and other canals and it has become a business of the Deputy Director of Agriculture, S.C.D., to supply full information to the promoters of these factories.

27. *Study of culminating point in the ripeness of cane.*—This study is going on for the last three years at Hol. These tests are taken at an interval of ten to twelve days and all the data regarding the weight of cane, extraction, brix, weight of gul and its ratio to juice and cane is recorded for two varieties, viz. E.K. 28 and Pundya. The following table will give the idea of ripeness and the culminating point :—

Date of planting was 24th January 1932.

Age of cane at harvest		Date of harvest		Gul to cane ratio	
				E. K. 28	Pundya
Mths.	ds.				
11	4	28th December 1932	.. ..	13·9	11·3
11	14	7th January 1933	.. ..	13·6	12·3
11	26	19th January 1933	.. ..	13·9	12·3
12	8	3rd February 1933	.. ..	14·8	13·5
12	20	15th February 1933	.. ..	14·2	12·6
13	0	25th February 1933	.. ..	..	13·5
13	10	7th March 1933	.. ..	..	14·1
13	20	17th March 1933	.. ..	..	13·6
14	2	27th March 1933	.. ..	..	13·1

From this statement it will be seen that the best time of harvest of E.K. 28 was 12 months and 8 days while in the case of Pundya it was 13 months and 10 days. During the year 1930-31 the best time of harvesting Pundya was 13 months and 20 days when the ratio was 14·7 and in the year 1931-32 it was 12 months and twenty-four days when the ratio was 15·1. The time of getting the best ratio will vary according to the date of planting, the nature of the season and the manure applied ; but it can be safely remarked that Pundya requires thirteen months for complete ripening under the Deccan Canals conditions.

28. *Shows and Demonstrations.*—During this year, 243 demonstrations, 28 Jamabandi agricultural meetings, 42 meetings of the agriculturists and 7 big shows were held. A short description of the big shows is given below :—

(1) *Agricultural and Cattle Show at Pandharpur.*—This show was organised by the Village Improvement Committee of Sholapur in collaboration with the Kartiki fair of Pandharpur. It was attended by 3 lakhs of cultivators. The show consisted of special sections of Agriculture, machinery, field produce, crop court, land development, cattle, horticulture, co-operation, subsidiary industries, health, veterinary

science, irrigation, research, dry farming, cottage industries, etc. A special lecture series was arranged on various subjects and cinema films and dramas were arranged. The Show was outlined on the lines of Presidency Agricultural Show. His Excellency the Governor of Bombay opened the Show on the 8th November 1932 and it was continued for ten days. The prize distribution was done by the Honourable Minister of Agriculture on the last day. The total collection of Rs. 38,220 was realised from which Rs. 25,061 were spent for the Show. Most of the burden of arranging this Show was fallen on the Agricultural Department and the Deputy Director of Agriculture, South Central Division, and his staff were making preparations of the Show for more than four months. The Collector of Sholapur Mr. H. F. Knight, I.C.S., and Mr. I. H. Taunton, I.C.S., and Rao Bahadur G. B. Paricharak deserve special thank for arranging the Show. A special report of this Show is being prepared by the Village Improvement Committee, Sholapur.

(2) *The Fruit Show at Saswad.*—This was arranged by the Agricultural Association on 5th December 1932. It was opened by Mr. D. S. Modak, the District Deputy Collector of Poona and was attended by 2,000 people. About 500 exhibits of the best fruit grown in Purandhar taluka were collected. A lecture series was also arranged in connection of the Show.

(3) *Agricultural and Cattle Show at Indapur.*—A fairly big agricultural and Cattle Show was arranged at Indapur on the 5th of February 1933 and about 1,200 exhibits and 150 cattle were exhibited. Special models of land development, cottage industries, fruit and vegetable stalls and magic lantern lectures were arranged. This Show was opened by Mr. D. MacLachlan, I.C.S., J.P., Collector of Poona, and was attended to by 3,000 people.

(4) *Agricultural and Cattle Show at Gondavale.*—An Agricultural and Cattle Show was organised at Gondavale, taluka Man of Satara district, on 25th November 1932 and it was opened by Khan Bahadur D. B. Cooper, M.L.C., and President, District Local Board, Satara. This was specially intended to foster the interest of Khillari breeders of the Maswad tract.

(5) *Agricultural Exhibition at Temburni.*—A special Agricultural Exhibition was arranged at Temburni, District Sholapur, in connection of the Co-operative Conference in April 1933. It was attended by 500 cultivators.

(6) A special Agricultural Stall was arranged in the All-India Industrial Exhibition held at Poona in November 1932 and it was kept open for one month.

(7) In the Ratnagiri District, five Taluka Agricultural Shows were arranged with the help of Mr. S. K. Wodeyar, the District Deputy Collector, and they were attended to by 1,500 people.

29. *Demonstration of Agricultural Improvements through Co-operative Credit Societies.*—The work mentioned on page 105 of the last year's report was continued during this year and the details of the work are given in the following statement :—

District.	Name of the credit society.	Work done for agricultural improvements.	
		Demonstrations.	Extentsion of agricultural improvements.
(I) Poona	(1) Ravangaon	(1) Seed grading (2) Treatment of Jowar for smut. (3) New crops. (4) Use of Artificial manures.	(1) 4,708 lbs. of Jowar was graded by 11 members. 1,182 lbs. of Bajri was graded by 5 members. 5,460 lbs. of wheat seed was graded by 9 members. (2) 3,350 lbs. of jowar was treated with sulphur dust by 14 members. (3) 18 acres of pusa wheat was sown by 8 members. (4) 4 members had grown Banilla-cotton and Akola Bajri.
	(2) Palasdeo	Do.	(1) 8 members have graded 280 lbs. of Pusa Wheat, 1,848 lbs. of Jowar, 142 lbs. Bajri. (2) 300 lbs. of Jowar seed was dusted with sulphur by 7 members.
	(3) Varvand	(1) Seed grading (2) Treatment of Jowar for smut. (3) New crops. (4) Use of Artificial manures.	(1) 5,712 lbs. of jowar, 168 lbs. of Akola Bajri, 1,610 lbs. of wheat seed was graded by 19 members. (2) 2,000 lbs. of jowar was treated with sulphur by 10 members.
(II) Canal area	(1) Pimpili (2) Kambleshwar. (3) Sangwi. (4) Belwandi. (5) Udhat. (6) Hanmantgaon. (7) Samvatsar.	Demonstration of standard Manjri method of sugar-cane cultivation.	One plot was arranged at Pimpili, two at Kambleshwar and Sangwi each. Four at Belwandi, three at Udhat, Hanmantgaon and Samvatsar each.

District.	Name of the credit society.	Work done for agricultural improvements.	
		Demonstrations.	Extension of agriculture improvements.
(III) Ahmednagar	(1) Hatgaon (2) Rui Chatisi. (3) Rui Divata.	(1) Growing of Jowar by dry farming. (2) Growing of jowar with seed grading. (3) Advantages of Akola Bajri.	
(IV) Sholapur	(1) Tembhurni. (2) Akola.	(1) Demonstration of seed grading and dry farming. (2) Introduction of new varieties, e.g. Nadiad Tobacco, Pusa wheat, etc.	
(V) Satara	Walwa, Koregaon, Karad, Khanapur, Satara, Khatav and Tasgaon have several societies affiliated to associations and the demonstration work, e.g. (a) seed grading, (b) distribution of (i) sieves, (ii) sulphur dust packets, (c) hire of ploughs amongst members, etc. was continued through the members of the Credit Societies.		

30. *Rural Uplift Work.*—The work mentioned on pages 107 and 108 of the last year's report received a good impetus during this year. In the Deccan, there are nearly 20 centres where the Rural Uplift work is going on and it is now contemplated that all these centres should be affiliated to the Deccan Agricultural Association. The main features of the work are (1) land development, (2) improvement of seeds, (3) introduction of new crops, (4) study of economic conditions, (5) improvement of sanitation and health, (6) better communication, (7) better living, (8) introduction of panchayats, (9) adult and mass education and (10) subsidiary industries. The Third Rural Uplift Conference was held at Kirloskarwadi in April 1933 under the Presidentship of the Chief of Phaltan which was attended by 800 people.

The District Local Board, Satara, has contributed Rs. 5,000 for this work and has selected Limb as the centre of activities. The Village Improvement Committee of Sholapur has selected Kumbhari, while the Deccan Agricultural Association has continued its activities at Khed, Shivapur Centre. The Agricultural Department has appointed one Kamgar at Shivapur to help the Rural Uplift work and the work is conducted under the guidance of the Deputy Director of Agriculture who is the Honorary Secretary of the Rural Uplift Committee.

31. *Agricultural Classes.*—During this year, twenty-five classes of agricultural improvements were arranged. Nineteen classes of one or two days' duration were held on the canals where full information about the improved crops on the Deccan Canals was given. Each class was attended by 20 to 40 students. A special class of Land Development and Horticulture was arranged at Khed Shivapur for fourteen days and it was attended by 48 students. The Director of Agriculture opened the class and lectures of eight distinguished experts were arranged. This class was much appreciated by the public and students from Poona, Satara, Sholapur and Southern Maratha States took advantage of this class. A special feature of this class was that it was attended by twelve lady students of Seva Sadan.

A class of horticulture was arranged for seven days at Godali Model Farm and Nursery (district Satara) and it was attended by 50 students.

A special class of sugarcane was organized at Kale with the help of the Taluka Development Association, Karad, for six days and it was attended by 40 students.

Another class of poultry was arranged at Satara in May 1933 with the help of the District Local Board and it was attended by 70 students.

In the Ratnagiri District, three vegetable and tobacco growing classes were arranged at Ratnagiri, Chiplun and Dapoli which were attended by more than 100 students.

From the experience of the past few years, it seems that people appreciate these classes and short courses and when the Agricultural Schools are discontinued, the Agricultural Education can be imparted to the rural areas by arranging such classes.

32. *Improvement of Grass Areas.*—The work mentioned on page 109 of the last year's report was continued at Barsi and Mahud Budruk. The season was favourable for the growth of grass; hence the difference in the improved area and the check was not so wide as that of last year. The residual effect of bone-meal could be seen in the yield of grass, viz. 3,300 lbs. per acre while the check plot yielded 2,500 lbs. of grass per acre. The increase was only 30 per cent. as against 60 per cent. of the last year. In the plot at Mahud Budruk the percentage of good grass was much higher.

33. *Tractor ploughing.*—Ploughing the land by tractor has become very common in the Deccan. All the sugar factories have got their own tractors, while Burma Shell Co. and Macbeth Bros. lend their tractor to the needy cultivators. The ploughing operations are also undertaken by contract by these firms. In the Manjri village, a very badly infected land has been cleared of by the Burma Shell tractor. In Sholapur District, Messrs. Desai and Bankatlal Soni have ploughed more than 300 acres of land. The Case Tractor of the Agricultural Department was taken on hire by Mr. M. L. Dahanukar for three months and has ploughed 250 acres of land at Belvandi.

34. *Manures.*—The use of artificial manures has now become very common and the work is greatly facilitated when the Imperial Chemical Industries has appointed agents and opened the depots for supplying these manures. In the Ratnagiri District there are fifteen depots for the supply of Ammonium Sulphate and Nicifos. During the year under report, the following manures are sold in Ratnagiri District :—

100 tons of Ammonium Sulphate.

8 tons of Bone-meal.

10 tons of Nicifos.

5 tons of Super Phosphate.

Supply of denaturalised salt at a concession rate of annas 8 per maund was continued and during the year permits for 2,067 maunds of salt were issued.

In the Deccan districts, the following quantities of manures were supplied to the cultivators, as a result of propaganda by the district staff :—

Name of manure.	Canal tract.	Poona.	Satara.	Nagar.	Sholapur.	Total.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
(1) Sulphate of Ammonia ..	1,604,016	692	16,300	22,380	560	1,644,448
(2) Nicifos ..	6,720	..	..	..	..	6,720
(3) Sulphate of Potash ..	2,240	600	..	200	240	3,280
(4) Nitrate of Soda ..	342	162	300	120	120	1,044
(5) Super Phosphate ..	400	448	480	680	800	2,808
(6) Oil-cake ...	25,870,391	960	2,000	1,920	1,200	25,876,471
(7) Bone-meal ..	..	480	480	1,200	1,500	3,660
Total ..	27,484,109	3,342	19,560	27,000	4,420	27,538,431

35. *Supply of seeds.*—Supply of seeds is one of the routine works of this department and the following statement shows the quantities of seeds supplied by the district staff :—

Serial num-ber.	Name of the seed.	Quantity of seed supplied.						Total.
		Canal tract.	Poona.	Satara.	Nagar.	Sholapur.	Ratnagiri.	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
1	N. R. Cotton ..	17,185	220	..	2,000	300	..	19,705
2	Big Japan ..	310	..	200	..	1,500	..	2,010
3	Dhaincha seed ..	1,815	100	..	..	..	..	1,915
4	Barseem seed ..	100	..	..	..	..	..	100
5	Tobacco seed ..	4	..	..	..	..	..	4
6	Sal ..	200	..	..	..	2	12	214
7	Dugadi Jowar ..	180	..	560	..	..	..	740
8	Nilva Jowar ..	4,000	310	..	..	..	..	4,310
9	Basarai Plantain suckers (No.) ..	3,400	..	10,925	1,000	400	..	15,725 No.
10	Mango grafts ..	175	..	300	..	200	2,000	2,675 ..
11	Lucerne ..	10	..	7	100	20	..	137
12	Turmeric sets ..	3,000	..	104	..	..	..	3,104
13	Grape seedlings ..	2,000	..	..	..	..	..	2,000 ..
14	Sann seed ..	84,876	..	..	..	600	..	85,476
15	Santra plants ..	..	5,000	3,100	800	250	300	9,450 ..
16	Pineapple suckers ..	..	..	..	..	..	600	600 ..
17	Vegetable seedlings ..	..	..	..	..	..	25,000	25,000 ..
18	Akola Bajri ..	..	340	1,220	4,500	225	..	6,285

Serial num- ber.	Name of the seed.	Quantity of seed supplied.						Total.
		Canal tract.	Poona.	Satara.	Nagar.	Shola- pur.	Ratnagiri	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
19	Pusa Wheat	..	845	2,500	350	333	..	3,528
20	Banilla cotton	..	50	..	50	240	..	340
21	Potatoes	..	500	12,360	400	80	..	13,340
22	Rice-seed	..	..	340	300	..	40,000	40,640
23	Jayant cotton seed..	..	..	2,770	..	..	..	2,770
24	Ginger	..	..	156	300	..	..	456
25	Other fruit trees ..	..	..	4,700	..	..	..	4,700
26	Nagali	..	..	..	..	..	8,000	8,000

36. *Sale of Implements.*—During this year, the following implements were sold by the staff :—

Name of the Implement.	Canal tract.	Poona.	Satara.	Nagar.	Shola- pur.	Ratna- giri.	Total.
(1) Sugarcane mills	21	8	6	..	4	..	39
(2) Iron Ploughs ..	175	12	24	48	36	4	299
(3) Seed drills ..	4	..	..	..	..	..	4
(4) Cyano gas Pump	6	4	2	8	..	15	35
(5) Spare parts of ploughs	..	Rs. 100 worth.	Rs. 48 worth.	Rs. 86 worth.	Rs. 350 worth.	..	Rs. 584 worth.

37. *Demonstration plots.*—During the year under report, the following number of demonstration plots were arranged in South Central Division :—

(1) Canal tract	..	..	418
(2) Poona	..	..	53
(3) Satara	..	..	61
(4) Nagar	..	..	105
(5) Sholapur	..	..	66
(6) Ratnagiri	..	..	65
Total	..	..	768

These plots consist of new crops, cultural and manurial demonstrations, different treatment of seeds, etc. and the whole staff is required to work hard to get the results of the plots.

38. *The work of the Nimbut Co-operative Cane Crushing Society.*—This is the second year of the working of this society under the guidance of the Agricultural and Co-operative Departments. Full details of two years are given below :—

	Year 1931-32.	Year 1932-33.
Area of cane crushed ..	33 acres.	46 acres.
Number of boilings ..	794	1,141
Number of working days ..	57	87

Working cost of the Power Plant.

	Rs.	a.	p.		Rs.	a.	p.
Crude oil, 326 gallons ..	122	4	0	448 gallons	156	12	0
Lubricating oil, 403 lbs. ..	61	14	0	491 lbs. ..	76	12	0
Grease, 18 lbs. ..	5	6	6	10 lbs.	4	0	0
Cotton Waste, 21 lbs. ..	2	7	6	18 lbs. ..	2	2	0
Kerosine oil, 5 tins ..	16	4	0	7½ tins ..	23	4	0
Total ..	208	4	0	....	262	14	0
Cost per pan ..	0	4	3	....	0	3	10

Detailed cost of gurhal for harvesting, carting, crushing and manufacturing of gul for the year 1932-33 :—

Harvesting of cane.	Carting cane.	Wages of Gulvya and Jalvya.	Cost of extra fuel.	Cost of crushing.	Total.	Number of boilings.	Cost per boiling.
Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.		Rs. a. p.
664 0 6	860 8 3	348 12 6	183 0 3	1,141 8 0	3,197 18 6	1,141	2 12 10

The average cost per pan of 325 lbs. of gul came to Rs. 2-12-10 and if the society had secured more area of cane this cost would have been further decreased.

39. *Propaganda through the Village School Teachers.*—During the year under report, 19 villages were selected for mass propaganda of Agricultural Improvements through the village teachers in Barsi Taluka with the permission of the Chairman of the District School Board, Sholapur. These teachers arranged seed grading of Jowar and groundnut, mixing sulphur dust with jowar seed, the use of improved seed-drill (15" to 18"), interculturings and managed 22 demonstration plots. In the Poona District, 10 more villages were selected for mass propaganda and they have done very useful work. The teachers at Veer, Vagholi and Deda took more interest in introducing dry farming methods, extension of Pusa wheat, Akola bajri, etc.

In Ahmednagar District the 50 sets of dry farming tools were working in 50 villages, but on account of the want of grant from the District Local Board, Ahmednagar, further progress could not be made. The season was also not favourable for dry farming method.

40. *Publications.*—During the year under report the following leaflets were completed :—

Serial No.	Name of Leaflet.	English.	Marathi.
1	Leaflet No. 10 of 1932 on "A Practical System of Storing Farm Yard Manure"	1	1
2	Leaflet No. 11 of 1932 on "Improved Nagli Varieties". ..	1	1
3	Leaflet No. 12 of 1932 on "Scum Strainer in Gul Boiling"	1	1
4	Leaflet No. 15 of 1932 on "Effective propaganda work done in connection with Agricultural Improvements on Deccan Canals"	1	1
5	Leaflet No. 1 of 1933 on "Improved Rice Strains for the Ratnagiri District"	1	1
6	Leaflet No. 2 of 1933 on "Sugar manufacture by Open Pan System"	1	1
7	Leaflet No. 4 of 1933 on "Improved Furnaces for Gul Boiling"	1	1

The staff had contributed several articles to the Shetki and Shetkari Magazine and College Magazine etc. Besides, short reports on crop and weather conditions, demonstration plots, meetings etc. were regularly supplied to the *Times of India* through the local reporter.

Section III.

AGRICULTURAL ORGANIZATION.

1. *Taluka Development Associations.*—The number of Taluka Development Associations in the five districts remained stationary at 19; but two more associations, viz. Shevagaon and Devagad are being registered. Except the Nira Left Bank (Baramati) Association and Taluka Development Association, Ratnagiri, all the Associations have done very good work. The Junnar and Patan Associations have improved their work. Out of the 19 Associations, the work done by Satara, Karad, Walva, Tasgaon, Rajapur and Dapoli Taluka Development Associations deserve special mention and all of them have been classed under "A". The Associations at Khed, Junnar, Madha, Karmala Wai, Javali, Patan, Khatai, Khanapur, Koregaon and Malvan are classed under "B"; while Baramati and Ratnagiri are classed under "C". The District Local Board of Satara has continued to give special grant of Rs. 5,000 to the ten Associations in Satara District and has also maintained a fruit and vegetable garden and a poultry farm at Satara. Khan Bahadur D. B. Cooper, M.L.C., and the President, District Local Board, takes personal interest in the development of these Associations. The Deputy Director of Agriculture, S. C. D., presided over the annual meetings of all the ten Associations during the month of May 1933 and chalked out the future programme of work.

2. *Non-credit Societies.*—The number of such societies in south-Central Division is 23. The Nandlapur Manure Society was cancelled while the Saswad Mali and Kopergaon Shetki Purchase and Sale Society was newly registered. Summary of the work done by each Society is given below :—

“ A ” Sale Societies.

	Value of produce sold.
	Rs.
(1) Haveli Taluka Agricultural Sale Society	90,802
(2) Nira Canal Societies Purchase and Sale Union, Baramati ..	3,03,160
(3) Barsi Taluka Sale Society	24,949
(4) Kurduwadi Purchase and Sale Union	29,997
(5) Warna Valley Co-operative Sale Union Ltd., Islampur ..	2,11,035
(6) Saswad Mali and Kopergaon Shetkari Purchase and Sale Society	1,27,327
(7) Mango Sale Society at Ratnagiri	211
(8) Mango Sale Society at Malvan	2,171
(9) Mango Sale Society at Vengurla	2,500

“ B ” Manure Societies.

	Value of manure distributed.
	Rs.
(1) Peth Manure Society	62
(2) Retra Harinax Manure Society	1,331
(3) Malkhed Manure Society	192
(4) Vadgaon-Haveli Manure Society	627

“ C ” Machinery and Implement Societies.

	Commission or hire earned
	Rs.
(1) Haveli Taluka Agricultural Machinery Society	1,451
(2) Pathardi Implements Society	1,174
(3) Sheogaon Agricultural Requisite Society	1,123
(4) Jamkhed Implements Society	497
(5) Madha Taluka Implements Society	181
(6) Tadavale Implements Society	114
(7) Pandharpur Taluka Implements Society	304
(8) Kapuskhed Implements Society	51
(9) Nimbut Co-operative Crushing Society	2,015

The Pathardi and Sheogaon Agricultural Requisite Societies are the best societies in this lot.

“ D ” Land Development Societies.

The Society at Mulegaon (District Sholapur) is newly registered by the Village Improvement Committee of Sholapur. An area of 42 acres and 8 gunthas out of 88 acres included in the societies' bunding scheme, was bunded during this year under the guidance of the District Agricultural Overseer, Pandharpur.

Section IV.

AGRICULTURAL SERVICES.

1. *Engineering Advice and Assistance.*—In spite of the “world wide slump” prevailed in the country there were 44 requisitions for help from the farmers of the division for the mechanical help out of which 13 were for pumping plants on wells, 8 were for pumping plants on rivers, 5 were for pumps on bored holes, 8 for cane-mills, 6 for sugar-making machinery, 1 for power dusting work and 1 for hand press and 2 for miscellaneous works. Out of the 44 requisitions, the Mechanical Assistant could attend 32 cases and the rest were postponed.

New Erections.—There were 6 erections during the year under report out of which 4 were for pumps and the rest 2 were for cane-mills.

The Government Machinery.—The Mechanical Assistant looked after the crushing machinery at Ranjankhole, Baramati and the Kopargaon Farm. He has dismantled the complete machinery and the gural sheds from the premises of the Manjri Farm and despatched same to the Padegaon Research Station and the workshops of the Agricultural Engineer to Government, Poona.

A field foot pump for killing rats with Cyano Gas “A” dust.—This pump has got all its parts detachable easily for inspection and they are of very strong construction and can be had at half the cost of the foreign makes, i.e. at Rs. 10 to Rs. 12 each.

A Hand Dust Gun to use sulphur dust for the Mango Trees and Betel Vine Yard.—This hand machine throws dust in a mist like form at a height of 16 feet. This pump has another feature attached to it for killing rats in the fields by adjusting the equipped fittings and it holds one lb. either sulphur or the Cyano Gas, “A” dust. This pump can be had for Rs. 6-8-0 yet it serves two purposes. It is light and handy.

A special spray for killing black ants for the use of the gul godowns and fields was also designed under the guidance of the Deputy Director of Agriculture, S. C. D., Poona, and the same supplied to Rao Sahab N. S. Borawake at his request for his own use and the results are awaited.

Sugar-making Plants by “Open Pan System”.—There are already 16 demands for the services of the Mechanical Assistant to install these plants in the division for the next year in addition to the usual yearly demand for his services in connection with other agricultural power machinery.

The Power chaff-cutter.—This was worked in the Walva Taluka. District Satara, and has cut 31,105 lbs. of fodder for the farmers.

The work done by Mr. Peter Rahatar deserves special mention for his special aptitude for research and adaptability of new machinery to suit the local conditions.

(2) *Pig Killing Campaigns.*—Although the post of the Pig Killing Officer is retrenched, the work of pig campaigns was helped by the Officer of the Department. This work is now entrusted to private bodies. A summary of the work done is given below :—

Serial No.	Name of the Tract	Period of campaign	Number of pigs killed	Cost of the campaign		Number of cartridges supplied for by the Department
				Rs.	a. p.	
1	Godavari Canals.	20th October 1932 to 18th December 1932.	24	85	8 0	100
2	Pravara Canals ..	5th April 1933 to 10th May 1933.	85	199	4 0	168
3	Koregaon (District Satara).	.....	36	75	0 0	75

(3) *Field Embankments.*—The post of the Bunding Officer was retrenched ; hence, the regular work of field embankment could not be undertaken. Mr. M. K. Shirole was then posted to Pandhapur as a District Agricultural Overseer and the following works were done under his supervision :—

(i) *Mulegaon Bunding Society.*—About 105 acres of land of the Members was surveyed and plans and estimates were prepared. Bunds for 15 acres were actually constructed.

(ii) *Nimbergi Nala Bunding.*—This was a joint scheme to be worked on co-operative basis. The members had deposited Rs. 1,500 for the work. The land was surveyed and the work of putting bunds is started.

(iii) *Tandulwadi Bunding Scheme.*—An area of 10 acres was surveyed and bunds laid.

(iv) Four sites at Aitavade in the Satara District were surveyed and schemes prepared.

(v) Mohol farm bunding was also undertaken and completed during this year.

Section V.

AGRICULTURAL EDUCATION.

There is only one agricultural school conducted by the Shikashan Prasarak Mandal at Rajapur. It had got only 10 students who have got through the course. This institution is now teaching agriculture to the students of the IV, V and VI standards of the Rajapur High School and they are required to go through the practical training.

There are 21 Agricultural Bias Classes in South Central Division and their examinations are taken by the District Agricultural Overseers. The classes in the Ahmednagar and Sholapur districts are doing quite well and some of the schools have exhibited the articles prepared by the boys, in the Pandharpur Exhibition.

Section VI.

CO-ORDINATION WITH THE OFFICERS OF OTHER DEPARTMENTS.

During the year under report, the officers of the Revenue, Irrigation and Co-operative Departments have rendered very valuable help in arranging demonstrations and shows. There were in all 43 Jamabandi meetings in which special programme of agricultural improvements was arranged. Besides, 66 demonstrations were arranged on the canal tract with the help of Irrigation and Co-operative Departments. The big Shows mentioned above were arranged with the help of Revenue Department. The District Local Boards of Satara and Sholapur have also rendered material help in conducting the activities of the Agricultural Department.

Divisional Board of Agriculture.—The Deputy Director of Agriculture was the Chairman of the Deccan Divisional Board, till 1st November 1932 when three meetings were held at Poona, Satara and Kopargaon. Non-official members have taken keen interest in the proceedings.

Miscellaneous.—During the year under report, the following officials and non-officials rendered material help to the Agricultural Department for which they deserve special mention and thanks of the Department :—

- (1) Mr. H. F. Knight, I.C.S., Collector of Sholapur.
- (2) Mr. I. H. Taunton, I.C.S., Collector of Sholapur.
- (3) Mr. S. K. Wodeyar, L.Ag., District Deputy Collector of Ratnagiri.
- (4) Mr. D. S. Modak, M.A., LL.B., District Deputy Collector, Poona.
- (5) Khan Bahadur D. B. Cooper, M.L.C., Satara.
- (6) Mr. Annapa N. Kalyani, Karad.
- (7) Mr. Shivram Ramaji Patil of Peth.

With the exception of a few, all the staff of this division has worked very hard to keep up the activities of the Department, even in these days of retrenchment.

V. V. GADGIL,

Deputy Director of Agriculture,
South Central Division, Poona.

Poona, 8th August 1933.

PROGRAMME OF WORK FOR THE YEAR 1933-34 IN THE
SOUTH CENTRAL DIVISION.

Research.

Kopargaon Farm—

- (1) Varietal trials of cane.
- (2) Nitrogenous top-dressing experiments with reduced dose.
- (3) Diversification in cane farming.
- (4) Improved versus local method of planting cane.
- (5) Adasali planting of Pundya, E.K. 28 and P.O.J. 2878.
- (6) Miscellaneous experiments of fodder crops.
- (7) Trials of Banilla and Marol cotton and spanish peanut.
- (8) Trials of agricultural machinery.

Mohol Farm—

- (1) To continue the trials of the selections of Maldandi strains such as No. 35-1 and 47-3 and also arrange their trials in Sholapur and Bijapur Districts.
- (2) To conduct the breeding of Striga resistant strains.
- (3) To test the high yielding strain of Tambadi Jogadi.
- (4) To conduct the trials of Dagadi Strain No. 15 at Mohol and also in 5 places of Nagar District.
- (5) To compare the yields of Bijapur Dagadi strains and also arrange their trial in Bijapur District.
- (6) To study the effect of different types of tals, waste weirs in soil erosion.
- (7) Improving the yield by seed-grading and tillage methods.
- (8) Trial of Banilla cotton and Big Japan Spanish peanut.

Ratnagiri Farm—

- (1) Trials of early strains of rice of the intensive series on Kurvat land.
- (2) Bagged seeds of Patni No. 6, Kolamba No. 79 and 184 and Kudai No. 25 to be obtained (10 lbs. of each).
- (3) Crosses between Patni No. 6 $\times$ Kolamba No. 79 to be tried in f₂ generation.
- (4) Trial of Panwel No. 61 and Waksal No. 207 to be made in 8 replications.
- (5) Trial of Bhadas No. 79 and local Bhadas to be arranged in 6 replications.

- (6) Trials of intermediate and late strains of Waksal and Warangal to be arranged.
- (7) Multiplication of seeds of Patni No. 6, Panwel No. 61 and Kolamba No. 79, 184 and Kudai No. 25 to be arranged.
- (8) Cultivation of Pine apples to be extended.
- (9) Tobacco to be tried as semi-kharif crop.
- (10) Trial of Spanish peanut and small Japan as a rabi crop to be continued.

Hatkamba Sub-Station—

- (1) Multiplication of the following nagali seeds, A16, B11, E31, E32, E62 and E44.
- (2) Trial of manures on Nagli.
- (3) Cultivation of Niger on fallow lands.
- (4) Cultivation of tobacco crop on varakas land.
- (5) Growing of sann for fibre and manure.
- (6) Planting of cashew nuts systematically.
- (7) Manuring of mango grafts.

Propaganda.

The propaganda work will be undertaken on the following lines :—

Sugarcane—

- (1) The trials of nitrogenous manures for top-dressing from 150 to 250 lbs. per acre for sugarcane.
- (2) Trials of sugarcane varieties such as Pundya, E.K.28, P.O.J. 2878, CO.290 and H.M.89.
- (3) Trials of manufacturing white sugar by Open Pan process.
- (4) Trials of improved furnaces and crushers.
- (5) Study of culminating point in the ripeness of cane.
- (6) Introduction of standard manjri method of cultivating cane.

Cotton—

- (1) Trials of Banilla and N. R. cottons.
- (2) Introduction of artificial manures for cotton.
- (3) Arrangement of seed farm for Banilla cotton seed.
- (4) Distribution of Banilla seed on all the canals.

Groundnut—

- (1) Varietal trials of different types.
- (2) Trial of Super phosphate on groundnut.
- (3) Distribution of Spanish peanut and other varieties.
- (4) Grading of groundnut seeds.

Wheat—

- (1) Trial of the new strains of wheat.
- (2) Introduction of Pusa wheat on a large scale.
- (3) Manurial trials on wheat.
- (4) Grading of wheat seed.

Jowar—

- (1) Grading of jowar.
- (2) Anti-smut propaganda for jowar.
- (3) Spacing and inter-culturing of jowar.

Potatoes—

- (1) Trial of artificial manures.
- (2) Introduction of Italian potatoes.
- (3) Campaign against tambara.

Tobacco—

- (1) Introduction of new strains in Konkan.
- (2) Artificial manurial experiments in Nagar and Satara Districts.
- (3) Cultural treatment.

Rice—

- (1) Distribution of pure seeds of improved strains such as Patui No. 6, Panwel No. 61, Kolamba No. 79, 184, 42 and 401 and Kudai No. 25 and Waksal No. 207.
- (2) Manurial trial on rice with Nicifos.

Naghi—

- (1) Distribution of pure strains.
- (2) Manurial treatment with sulphate of ammonia and bone-meal.

Bajri—

- (1) Distribution of Akola bajri and some other strains.
- (2) Grading of bajri.

Other crops—

- (1) Introduction of fruit trees.
- (2) Manuring mango grafts.
- (3) Artificial manure experiments on chillies, onions, turmeric, etc.

General work.

- (1) Distribution of seeds, manures, implements, etc.
- (2) Campaign against insect attack, fungus disease and pigs, rats, etc.
- (3) Introducing agricultural improvements through co-operative societies and village teachers.
- (4) Holding short classes on various crops.
- (5) Helping the cultivators in land development.
- (6) Arranging shows and demonstrations.
- (7) Helping Taluka Development Associations.
- (8) Publicity of Agricultural improvements by leaflets, bulletins and by writing articles in various newspapers, magazines, etc.
- (9) To conduct rural uplift work in various centres.
- (10) To arrange dry farming trials on a large scale.
- (11) To supply premium bulls and improvement of grazing land.
- (12) To develop poultry industry in the district.
- (13) Tractor ploughing.
- (14) Demonstrations of power chaff-cutter.
- (15) Helping the cultivators in the erection of power crushers, sugar-making and pumping plants.
- (16) Co-ordination with the officers of other departments.

V. V. GADGIL,

Deputy Director of Agriculture,
South Central Division, Poona.

Poona, 8th August 1933.

APPENDIX E.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF
AGRICULTURE, SOUTHERN DIVISION, DHARWAR, FOR
THE YEAR 1932-1933.

(1) I held charge of the Office of the Deputy Director of Agriculture, Southern Division, throughout the year. Rao Saheb G. L. Kottur continued as Cotton Breeder and Mr. Hulkoti as Cotton Superintendent, S. M. C., Dharwar.

As a measure of retrenchment, one Graduate Assistant, Mr. B. S. Channigeri was sent on leave preparatory to retirement. Mr. V. S. Kulkarni, the District Agricultural Overseer, Gadag, was deputed to Tractor work. Mr. S. G. Kadkol, Superintendent, Gokak Farm, was appointed as District Agricultural Overseer, Gadag. Mr. S. G. Kelkar was appointed as Superintendent, Gokak Farm. Mr. V. M. Chawan, Rice Breeder, Mugad Farm, was transferred as Assistant Professor of Botany and Mr. T. R. Khadilkar was appointed as Rice Breeder, Mugad Farm. Messrs. B. H. Ghatigar and V. S. Abhyankar who were transferred from South Central Division last year were taken back and Messrs. B. H. Patil and P. S. Pandya have been given this year. Mr. S. F. Kotur, Cotton Overseer, Hubli, was transferred as District Agricultural Overseer, Bagalkot, and Mr. B. H. Patil was appointed as Cotton Overseer, Hubli.

The temporary staff entertained for extension of Cotton Work round Hubli and Gadag with the aid of the Indian Central Cotton Committee continued. One graduate assistant and one kamgar were newly appointed for Athani Cotton Seed Multiplication Scheme. For Economic Enquiry into the cost of production of crops (Cotton) in Dharwar District, a graduate assistant was appointed as District Supervisor and 6 non-graduate assistants as Village investigators. This work is financed by the Imperial Council of Agricultural Research and the Indian Central Cotton Committee, acting together and it is to be conducted for three years.

Season.

(2) Antemonsoon and early monsoon rains were scanty and the sowing of early kharif crops like paddy in Mallad and groundnut and Udid in Gadinad was late. The regular monsoon commenced in July; but owing to continuous rains without any adequate breaks thereafter, timely interculturing operations were not possible and the fields went weedy in most places. The cost of hand-digging was abnormal and the cultivators neglected this operation. Almost all kharif crops except paddy suffered from excess of moisture and rank growth of weeds and gave yields below normal. Rice was benefitted by "Hodata" operations which could be done by impounding the beds with water and its yields approximated to normal in some places and ranged from 60 to 80 per cent. in others. Kharif jowar suffered most in Gadinad where it is grown on an extensive scale and gave only 40 to 60 per cent. normal yield. It remained stunted in growth due to excess of moisture and its flowers

were washed by rains in October and November. Cotton too remained stunted in growth for a long time. It was revived in January by fair weather especially in the eastern dry tract but too late to give a normal yield. It produced many bolls but they did not develop properly and were overtaken by antemonsoon rains in March with a result that both quantity and quality of cotton considerably suffered. The yields of cotton ranged from 40 to 60 per cent. of normal in Gadnad and 60 to 80 in Yerinad. Groundnut did better than jowar and cotton. Pulses shared fate with kharif jowar. The season was favourable to Rabi crops especially to wheat and gram which gave normal yield. The growth of Rabi jowar was good but the crop suffered from unfavourable winds at the time of grain formation and gave poor yields ranging from 50 to 60 per cent. normal. The agricultural season though characterised by heavy rainfall was unfavourable to crop production. The low yields and the continued low prices have dragged the cultivators deep into debt. They could not pay off even the interest on their dues during the year under report.

(3) The work done during the year is summarised under the same heads as it was done in previous years to facilitate references and comparison where needed, viz. :—

- (a) Research and Experiments.
- (b) Propaganda.
- (c) Organisation.
- (d) Services to the public.
- (e) Agricultural Education.
- (f) General.

(a) *Research and Experiments.*

(4) *Dharwar Farm.*—Plant breeding work on cotton which is the main money crop of the Division continued to receive major attention. Jayawant cotton was compared for yield in six replicated plots with other promising cottons. Results obtained are given below :—

Serial No.	Name of Cotton.	Yield of kapas per acre.	Ginning per cent.	Wilt per cent.
1	Jayawant	361	29.0	4.2
2	Kumpta	430	27.0	13.3
3	Dharwar No. 1	352	29.0	31.0
4	Dharwar No. 2	483	29.0	3.1
5	K. W. R. × 15—Strain No. 17 ..	427	32.9	5.1

Jayawant was about a fortnight later than Dharwar No. 1 and Kumpta cottons. It had more number of bolls per plant but owing to March and April rains the bolls did not open properly and the variety yielded less than Kumpta this year though the difference is not significant.

K. W. R. $\times$ 15 strain No. 17 is a very good cotton in reserve and its performance in replicated series is striking. The other promising wilt-resistant cottons in reserve are Dharwar No. 1 $\times$ Dharwar No. 2, strain 1-0-1 and Dharwar No. 2 $\times$ 15 strain 1-1. These were compared with Jayawant in single plot and they gave better results than Jayawant. Dharwar No. 1 $\times$ Dharwar No. 2 strain 1-0-1 is another strain of the same cross from which Jayawant is selected. It is early and possesses the same properties as Jayawant. This will be included in replicated trial of promising varieties next year. Dharwar No. 2 $\times$ 15 strain 1-1 is an early ripening, high ginning and good yielding cotton but its staple is short and is reported to spin only 30-32 counts against 40 of Jayawant.

(5) The new crosses that were under observations were Jayawant $\times$ 15 in F 4 generation, Jayawant $\times$ Comilla in F 3 generation, Dharwar No. 1 $\times$ Comilla in F 3 generation and Jayawant $\times$ Million Doller in F 2 generation, Jayawant $\times$ 15 has given some pure strains which gin 33 per cent. and possess other desirable characters of Jayawant. These will be tested during the coming season. The other crosses were found to be late and only a small number of plants yielded cotton. A few selections have been made which will be tested further.

(6) *Selection of types immune to wilt.*—After the closing of the Special Cotton Mycologist's section during the year under report by the Indian Central Cotton Committee, the testing of the cottons under the rigorous controlled conditions was taken up by the Department with a view to isolate, if any, strains completely immune to wilt. In pots with wilt infected soil maintained at a temperature of 20°–25° C, Jayawant cotton showed 60 to 80 per cent. wilt where all plants of Dharwar No. 1 cotton died. Jayawant plants that survived after a period of 45 days were transplanted into the fields the soil of which was known to be full of wilt. 30 plants have yielded seed and they will be tested further. Dharwar No. 2, Kumpta wilt resistant $\times$ 15 and Kumpta-Bailhongal 7 will also be similarly tested.

(7) Jayawant cotton was tested for wilt resistance along with other cottons again during the year, at Bailhongal where the soil is much affected with wilt and it showed only 2.9 per cent. wilt against 22.2 of Dharwar No. 1. From the results of past three years, it is observed that Jayawant resists wilt at Bailhongal in the same way as at Dharwar and the experiment will not be repeated.

(8) Selfing of Jayawant and Gadag No. 1 cottons was done on an extended scale to meet the requirements of Hubli, Athani and Gadag Schemes. In all 200 lbs. selfed seed of Jayawant was produced for Hubli and Athani Schemes on Dharwar farm and 345 lbs. of Gadag No. 1 for Gadag Scheme on Gadag farm.

(9) *American Cotton work.*—The season was very unfavourable for American cottons. They all suffered seriously from Red Leaf disease. Experiments with sulphur dusting were spoiled by rains which fell immediately after dusting and which did not allow any further operations of dusting. The selection in Dharwar-American 2-6-5 was observed to

resist Red Leaf blight better than Gadag No. 1 and is better in ginning percentage and staple also. It will be tested for yield during the coming season. Dharwar-American from Negalur being reported to be Red Leaf resistant, seed was obtained and tried at Dharwar. It did resist the disease better than Gadag No. 1; but it was found to be impure for many other characters such as ginning percentage, staple and boll size. Selections have been made in this cotton only for Red Leaf resistance. Dharwar-American Ron strain 2 was crossed with Gadag No. 1 with the object of getting a resistant type and with Co. II with the object of combining earliness and staple. In F₁ generation—Dharwar-American Ron strain 2 $\times$ Gadag No. 1 had hairiness to the extent of Gadag No. 1 and dark green leaves of Dharwar-American Ron strain 2. It was clearly more resistant than the resistant parent. It is proposed to continue the studies of these crosses during the coming season.

(10) *Spinning tests*.—Nine samples were sent to the Director of Technological Laboratory, Matunga, for testing their spinning value and the following are the results :—

Dharwar No. 1—36s, Jayawant—40s, Kumpta—30s, K. W. R. $\times$ 15 strain No. 17—40s, Dharwar No. 2 $\times$ 15 strain 1—1—33s, Dharwar No. 2 $\times$ 15 strain 2—3—32s, Dharwar No. 1 $\times$ Dharwar No. 2 strain 1—0—1—35s, Gadag No. 1—33s and K. W. R. $\times$ 2519—34s.

(11) *Seed tests*.—Samples of pedigree cotton seed stored for distribution by Hubli and Gadag Cotton Sale Societies were tested as usual for their germination. The percentage of germination varied from 83.0 to 96.5 in Jayawant received from Hubli Sale Society and from 83.5 to 92.5 in Gadag No. 1 cotton received from Gadag Cotton Sale Society.

(12) *Small leaf disease in cotton*.—It appeared on the farm as well as in cultivators fields this year on a large scale. Unlike wilt, it was observed late from November onwards. The affected plants do not die; but become sterile. Sometimes there is partial infection. Branches which are not affected produce flowers and bolls. This disease was observed in all varieties of Asiatic cottons, the American group remaining quite unaffected. The incidence varied from variety to variety and from plot to plot. Jayawant was attacked less than Kumpta and Dharwar No. 1. It is proposed to study more about this disease during the coming season.

(13) Selected strains of Fulgar white, Fulgar yellow, Bilichagan, Nandyal, and Savaner varieties of jowar, were maintained and seed was distributed to the cultivators from Dharwar farm. The demand from Nandyal continued to be more than for other varieties. In all 517 lbs. of Nandyal seed sufficient for 129 acres was distributed during the year. Spanish peanut variety of groundnut strain No. 5 was sown over 16 acres 34 gunthas of Dharwar farm and seed was distributed round Dharwar, Gadag, Haveri and Bailhongal. Selection in Pondicheri variety was continued during the year and a strain is ready for trial in the Mundargi Petha of the Dharwar District.

(14) *Other crop experiments on Dharwar Farm.*—The other important crop experiments conducted on Dharwar farm are summarised below :—

Five varieties of jowar viz. Nandyal, Fulgar white, Fulgar yellow, Bilichagan and Muddinandyal were compared on Fisher's method in six replications. Nandyal gave better yield than others. Five varieties of cotton, viz. Jayawant, Dharwar No. 1, Dharwar No. 2, Dharwar No. 1 × Rosea and Kumpta were compared on Fisher's method in 5 replications. Contrary to the results of past years, Jayawant yielded less than others. This is due to the lateness of the crop owing to excessive rains. Five varieties of wheat, viz. Local, Bansi strain No. 103, Bansi strain No. 808, Pusa 12 and Pusa 4 were compared. Bansi strain No. 103 gave higher yield than others. Pusa 12 and Pusa 4 wheats yield far less than local and they will be discontinued in further yield trials. Three varieties of tobacco, viz. Nadiad, Adcock and Nipani were compared on Fisher's method in five replications. Nadiad continued to give highest yield. The disease *Cercospora* damaged the crop to a great extent. Samples of all the three varieties were sent to the Agricultural Chemist to Government for analysis. Adcock contains least quantities of ash and nitrogen and highest quantity of Nicotin.

(15) *Manurial experiments.*—In the farm-yard manure experiment 10 tons per acre has given higher yield of jowar than others. The difference between manured and unmanured plots was very marked during this year of heavy rainfall. No manure plot gave 361 lbs. of jowar per acre whereas 10 tons farm-yard manure gave 1503 lbs. With all these differences, the extra yields have not covered the extra cost of manuring owing to low prices. The yields of cotton varied with the quantity of manure given to jowar crop in the previous year. No manure plot gave 77 lbs. seed cotton per acre whereas 15 tons per acre 470 lbs. The results of San green manuring continued to be encouraging. The application of sulphate of Ammonia to jowar and cotton gave significantly higher yields of both crops. The extra yield covered the extra cost of manuring in the case of jowar crop whereas it did not do so in the case of cotton. The application of bone meal to jowar and cotton has not given any encouraging results.

(16) *Rotational and Cultural experiments.*—In three year rotation experiment, tobacco-jowar-cotton has continued to give better results than wheat-jowar-cotton or groundnut-jowar-cotton. The tobacco crop suffers from *Cercospora* disease every year and if remedies are found to check this disease, the results are likely to be still more striking. In two year rotation experiment groundnut-jowar has given better results than tobacco-jowar or cotton-jowar. Groundnut and gram is found to be better rotation to jowar than groundnut alone or groundnut and wheat. In seed rate experiment on groundnut, 120 lbs. seed rate has given better results than 60 or 80 lbs. cotton and groundnut in alternate rows has given better results than cotton groundnut in blocks. Two acres of groundnut and cotton in alternate rows followed by jowar gave a total net profit of Rs. 32 against two acres of groundnut and cotton in blocks one acre each followed by jowar fetching a total net profit of Rs. 19

only. Middle of July has been found to be good for sowing groundnut and not earlier or later. Unseived jowar seed has given higher yields than seived seed this year. Length and cross wise sowing of wheat was found to be as good as length wise sowing only. The application of "Granosan" was not found to benefit potato crop against *Sclerotium rolfsii*. In the small garden of the Dharwar farm, mangoes and figs continued to receive attention. Two dustings with sulphur were not enough to control the mango-hoppers and a third one was found to be necessary. The season for mango was not good. Fig plants were treated with sulphur dust against rust with good results. The trials of wheat thresher, wheat winnower and cotton-stalk-uprooter were conducted on Dharwar Farm and results have been recorded. The results of wheat thresher have been encouraging whereas those of winnower and cotton-stalk-uprooter need confirmation which will be done next year.

(17) *Dharwar Farm is not only an experimental farm but also a seed farm.*—Selfed Jayawant cotton seed was grown in the 2nd stage on an area of 47 acres 6 gunthas and the yield of seed cotton obtained was 13,686 lbs. giving 9,564 lbs. seed sufficient for Hubli and Athani Schemes in the 3rd stage. The produce was taken to Hubli Cotton Sale Society where it fetched a good price of Rs. 101/115 per Naga against bazar rate of Rs. 93/112 to 115. The ginning percentage of Farm Jayawant cotton was observed to be 29.

(18) *Gokak Farm.*—Sugarcane continued to receive major attention. J. 213 was compared with local Pundia cane. It gave 11,668 lbs. gul per acre against 8,724 lbs. J. 213 is earlier, more tillering and more drought resistant than Pundia and seems to suit Gokak Canal tract. H.M. 544 was compared with Pundia and it gave 13,384 lbs. gul per acre, against 10,720 lbs. H.M. 544 is a late variety. H.M. 544 was compared with yellow Mauritius in karl soil and it gave 10,544 lbs. gul per acre against 8,424 lbs. H.M. 544 is in all respects better than yellow Mauritius. Java 213 planted 4' apart was compared with that planted 3' apart. The former gave higher yield. Maize is the staple crop of the Gokak Canal Tract. Maize and Tur was compared with Maize and Gadag No. 1 cotton. This year unlike in previous two years maize and Tur gave better results. Cambodia cotton was compared with Gadag No. 1 cotton and it continued to give higher yield. The season for cotton was not good this year. Two strains of Maize were compared with local but were not found to be better yielding. Selection in Maize will be continued. Sulphate of Ammonia 75 lbs. N.+cake 75 lbs. N. per acre applied to Pundia variety of sugarcane continued to give better results than Calcium cyanamide 75 lbs. N.+cake 75 lbs. N. per acre. The three year rotational experiment—Sugarcane cotton-maize and Tur vs. Sugarcane-cotton-san-green manuring—was continued during the year. The yield of sugarcane after San-green-manuring was higher than that after Maize and Tur. The yields of cotton were almost equal. Conclusions will be drawn when the cycle is completed.

(19) *Nursery and Orchard.*—The Nursery and the Orchard on Gokak Farm continued to be a paying concern. The total receipts were Rs. 1,115 and the expenditure was Rs. 740 showing a net profit of Rs. 375

against Rs. 229 last year. The demand for lemon seedlings has very much increased. The plaintain garden completed its 4th year and gave an outturn of 1,06,304 fruits and a net profit of Rs. 107 per acre, though the trees suffered from Anthracnose. Pomegranates were planted on an area of $1\frac{1}{5}$ acre during the year and gram was taken as an inter crop. The cost of cultivation was Rs. 128 per acre. The cultivation of gram gave a net profit of Rs. 24. The net cost, therefore, came to Rs. 104 per acre. The cost of cultivation and income of this plot will be recorded regularly every year as pomegranates is a crop likely to be taken up by the cultivators of Gokak Canal Tract.

(20) *Mugad Rice Breeding Station*.—Four promising strains of Mugad, viz. Early No. 161, Inter Nos. 81 and 249 and Late No. 141 and three strains of Antersal, viz. Early 67, Inter 90 and Late 200 which were proved to be more yielding than local were multiplied on Mugad farm. 3,960 lbs. seed of Mugad strains sufficient for about 48 acres and 2,431 lbs. seed of Antersal strain sufficient for about 30 acres were produced for further multiplication in cultivators' fields. 24 strains of Mugad and 28 strains of Antersal have been kept in reserve. They have been observed to be constantly good yielding. They will be compared during the next season with standard strains and those which do not come to the mark will be eliminated.

(21) The work on Mugad Kolumba cross was not successful in producing a fine heavy yielding strain which would replace Mugad strain No. 81, and it was decided in Crop Research Committee after full discussion to discontinue it. Selection in Dodagya variety of paddy was continued in its third year. Eleven high yielding and early maturing strains have been selected for further study on botanical and economical characters during the coming season. Observations on Gonag were continued. In the coming year it is proposed to make a cross between wild gonag and cultivated paddy with a view to study the genetics of grain shedding habit in rice. To the group of presidency rices, two collections from Nagpur have been added—one with purple auricles and the other with purple leaf sheath. These may be useful for identifying field gonags.

(22) *Kumpta farm*.—This farm came under the control of the Deputy Director of Agriculture, Southern Division, during the year under report, the post of Deputy Director of Agriculture, Konkan, being kept in abeyance as a measure of retrenchment. Rice Breeding is the main work in this farm. Among early strains Jeddu No. 1061 and Maskati No. 1315 have given 21 per cent. and 17 per cent. higher yield respectively than local. The performance of these two strains has been constantly good for the past four years and it is proposed to push them out into the district. Among late strains Halaga 244 and 1,501 (Red kernalled) have given 52.5 and 21.8 per cent. higher yield respectively over local. They were tested by Fisher's method. Selections in white kernalled Halaga variety of paddy suited for upghat talukas was continued. Six strains have been found to be promising and they will be tested for further selections and elimination during the next season. "Kane" pest was serious during the year under report specially to the Late varieties of

paddy. A close study of this pest seems to be necessary and the Assistant Professor of Entomology to the Government of Bombay has been approached in the matter. Ammophos, Nicifos, Calcium cyanide and bone meal were tested with and without farm yard manure on late Halga variety of paddy. Kane pest vitiated the experiment and results were not reliable. Charred bone meal was compared with milled bone meal according to Fisher's method. Milled bone meal gave 46 per cent. and charred bone meal gave 9 per cent. increased yield over farm yard manure. Ploughing with Meston plough was compared with that of country plough and the former gave 5 per cent. higher yield than the latter.

(23) *Experiments on sugarcane in Kumpta farm.*—Among fertilisers experiments the application of the mixture of sulphate of ammonia and Undi cake has given better results than all other fertilisers. The experiment was carried on Red Mauritius variety of cane and the yield was 11,584 lbs. liquid gul per acre which was 14.2 per cent., over that the area treated with farm yard manure. Five varieties of cane, viz. J. 213, Co. 290, Co. 312, H. M. 87 and H. M. 544 were compared on Kumpta farm H. M. 87, Co. 312 and Co. 290 have given promising results. The experiment will be repeated. With a view to see whether cane could be grown on Mal lands without water, Seedlings of Co. variety were raised in seed beds and were transplanted in the first week of June in Mal land. No irrigation was given to the crop after transplanting. It was harvested by the middle of December and 7,000 lbs. liquid gul was obtained with a net profit of Rs. 50 per acre. The experiment will be repeated.

(24) *Experiments on betel-nut and coconut trees.*—In the fertiliser experiment on betel-nut conducted in a cultivator's field, it was observed that bonemeal in combination with either Undi cake or sulphate of ammonia in the presence of potassium oxide gives a higher yield than others leaving a net profit of four pies to one anna per tree. The cultivation of coconut as a dry crop experimented on Kumpta farm was continued and the growth of the trees has been satisfactory.

(25) *Other crops on Mal land.*—Tobacco, chillies, gul and Queen pine apple showed signs of success on Mal land.

(26) *Gadag Seed farm.*—With the object of selfing and multiplying selfed seed of Gadag No. 1 in the 2nd stage for the Gadag Cotton Seed Multiplication Scheme, a Seed Farm was established at Gadag in the year 1931-32. The area of this farm is $54\frac{1}{2}$ acres and half of it goes under Gadag No. 1 cotton every year. The quantity of selfed seed and that raised from selfed seed during the year under report were 345 lbs. and 3,600 lbs. respectively. These quantities are quite sufficient for the requirements of Gadag Scheme.

(27) *Tegur Cattle Breeding Farm.*—The progeny of the cross between local cows and Amratmahal bull is showing marked improvement. The performance of the new bull is striking. 13 bull calves and 21 cow calves were born during the year. The total number of the herd on 31st March 1933 was 140 against 130 last year. The bull calves produced on Tegur farm have very much attracted the attention of the cultivators

of Mallad tract. Four breeding bulls have been given out in this tract with a view to observe their performances. Results of crossing local sheep with a Merino ram have also continued to be good. Four rams have been sold to the shepherds for breeding. Hay and silage were prepared on the farm as usual and jowar and kulthi were grown both for grain and fodder. The condition of cattle was kept up with very small expenditure of Rs. 16 per head on an average.

(28) *Experiments in cultivators' fields.*—The District staff continued to conduct experiments as usual in cultivators' fields. Jayawant cotton was compared with local Kumpta in 13 places in Navalgund, Bijapur, Bagalkot and Bailhongal talukas. In all these places, Jayawant cotton has given slightly higher yield than Kumpta though the crop was observed to be later. If the crop was not overtaken by ante-monsoon rains, the yields would have been still higher. Gadag No. 1 cotton was compared with Dharwar American in three places in Gadag and Ron talukas and in all these places the former has done better than the latter. The Hubli and Gadag Cotton Sale Societies which were raising doubts about the yields of Jayawant and Gadag No. 1 cottons will, it is hoped, see there are no grounds for apprehension. CO₂ cotton was compared with Gadag No. 1 cotton in seven places under irrigation in Ranebennur, Chikodi, Gokak and Bijapur talukas. The crop was affected by aphides in some places. In all places CO₂ has given better results than Gadag No. 1 cotton. The experiments will be repeated. The selected strain of Fulgar white variety of jowar was compared with local in two places in Bailhongal taluka and in one place in Haveri taluka. In two plots out of three the crop suffered from excess of moisture and the experiment was vitiated. In one plot at Bailhongal the selected strain gave higher yield than local jowar. Selected strain of Nandyal variety was compared with local at Dharwar and it gave 28.6 per cent. higher yield. Arrangements have been made to multiply the seed of these varieties locally. Selected strains of paddy were compared with local in 12 places round Dharwar, Kalghatgi, Haveri, Hirekerur and Khanapur and these have given higher yields in almost all places. Mugad 81 has been found to be popular in most places. Among others, Mugad 249 is liked in Mundgod petha, Antersal 200 round Dharwar and Mugad 141 under Dharma Canal in Hangal taluka. Among wheat varieties, Pivala Kathya strain Nos. 103 and 808 gave better results than local at Bijapur and Athani. Maldandi strains of Rabi jowar gave better results than local at Bijapur and seem to have scope there. Nadiad No. 6 tobacco seed was distributed especially in Chikodi and Bailhongal Divisions of the Belgaum District. It was found to give higher yield than Nipani local. Spanish peanut variety of groundnut strain No. 5 was compared with local at Dharwar, Haveri, Chikodi and Bailhongal and the yields of strain No. 5 were higher than those of local everywhere except at Chikodi. Charred bone meal was tried at Dharwar, Belgaum and Haveri centres and the results have been encouraging. Dry farming experiments conducted at Bijapur go to suggest that the value of extra yields obtained by following the dry farming methods, does not cover the cost of extra operations and as such they do not stand the economic test with

local method. Observations on these various experiments in cultivators' fields were made at regular intervals and harvesting was done under the close supervision of the District Agricultural Overseers. All observations and yields have been recorded in experimental note-books as usual in the past three years. The experiment of destroying prickly pear with the aid of cochineal insects undertaken last year became very popular this year and experiments were conducted in all the three Districts of Dharwar, Belgaum and Bijapur with very good results. The destruction of prickly pear under this method is very cheap and complete. It has been adopted by many individual and local bodies including Municipalities and District Local Boards. The progress of this work in the Southern Division has been very much appreciated and is going by leaps and bounds.

(b) *Propaganda.*

(29) *District Cotton work.*—Multiplication and distribution of Jayawant and Gadag No. 1 cotton continued round Hubli and Gadag respectively. The reserved area under Jayawant in Hubli centre was 15,019 acres and that under Gadag No. 1 in Gadag centre was 22,129 acres. A new seed-multiplication scheme was started at Athani during the year with the aid of the Indian Central Cotton Committee and a reserved area of 1,000 acres was organised at Kagwad. The crop in these reserved areas was as usual inspected from time to time and rogued. The roguing expenses ranged from 4·4 to 4·86 pies per acre. The produce was collected and ginned separately and the seed obtained has been stocked for distribution during the coming season. The quantity of work done is summarised in the following statement:—

Name of variety.	Stage.	Quantity of seed distributed in 1932-33.	Area in acres.	Quantity of produce obtained in dokras.	Approximate quantity of seed purchased for distribution in 1933-34.	Quantity of seed to be purchased.	Total quantity of seed to be stocked for 1933-34.
		lbs.	Acres				
Jayawant ..	II	....	....	38	10,014	986	11,000
	III	15,027	1,117	472	1,09,340	50,000	1,60,000
	IV	1,45,408	13,902	2,904	6,52,320	2,17,080	13,39,800
	V	1,606	53,481	430	1,20,400		
	Old stock ..	....	....	....	3,50,000	....	....
	Total.	8,28,041	68,500	3,844	12,42,074	2,68,726	15,10,800
Gadag No. 1	II	....	20	7	1,595	5	1,600
	III	4,140	475	103	24,274	....	20,000
	IV	11,484	1,181	391	89,034	1,06,692	2,00,000
	V	2,14,919	2,043	1,963	4,61,634	7,666	9,78,400
	VI	5,41,057	31,970	40	9,100		
	Old stock ..	....	....	....	5,00,000	....	....
	Total.	7,71,600	54,100	2,504	10,85,637	1,14,363	12,00,000

(30) *Grading and Auction Sales.*—In all 3,724 dokras of Jayawant and 8,515 dokras of Gadag No. 1 cotton were graded for auction sales. The graded cotton fetched better prices than those prevailing in the market. Three auction sales were held at Hubli and six at Gadag. The top grade Jayawant with a ginning percentage of 30·75 received a price of Rs. 123 per *naga* of (1,344 lbs.), when the prevailing rate for ordinary bazar cotton was Rs. 112 to 115. Similarly the top grade Gadag No. 1 cotton with a ginning percentage of 33·33 received a price of Rs. 143 per *naga* against Rs. 130 for bazar Gadag No. 1 cotton.

(31) *Working of the Cotton Transport Act.*—There were 20 check stations at the beginning of the season and two new ones were opened on the border of Bilgi petha later. The work of supervising these check stations was entrusted to the District Agricultural overseers. It is an additional work which they do at great inconvenience to their genuine duties. It is observed that one watchman in important check stations where movement of cotton is great is not enough to do his duties day and night. Two are necessary. Illicit import by rail is altogether stopped and that by road is greatly minimised. Licences were issued as usual from Gadag, Bagalkot and Nargund offices. The work done in these offices is tabulated below :—

Name of office.	Number of licences issued.		For number of dokras.		Actual import in dokras.	
	Rail.	Road.	Rail.	Road.	Rail.	Road.
Gadag ..	181	861	5,210	21,638	2,627	9,099
Nargund ..	..	139	..	1,344	..	312
				carts		carts
Bagalkot ..	54	157	1,536	3,827	1,005	1,971

The work of issuing licences and inspecting the arrivals into the markets has now been systematised and rules have been framed for the guidance of licencing officers and dalals who receive the licenced cotton. With these arrangements the import of cotton from outside the protected areas is well controlled. In the beginning of the season some irregularities were noticed in the case of imports to Gokak mills, but they were soon set right with due warnings to the mills and their agents. The Cotton Transport Act is working well in the interest of the growers as well as the consumer of improved varieties of cotton in the Southern Division. I must again state here that inspection of check stations and tracing illicit import by road is engaging much attention of all the district staff including that of the Deputy Director and I am feeling that a special hand for supervision is absolutely necessary.

(32) *General district work.*—The grant under demonstrations was very limited during the year and the District Agricultural Overseers were, therefore, instructed to conduct their demonstrations like last year mainly

through the Taluka Development Associations and utilised the limited funds of the Department in places where such Associations do not exist. Demonstrations of successful standing crops of selected strains of cotton, paddy jowar, groundnut, wheat and tobacco in experimental plots continued to receive major attention of the district staff all over the division. Propaganda in connection with the spread of selected strains of paddy in Mallad, of selected strains of cotton and groundnut in Gadinad and Yerinad, of selected strains of tobacco in Chikodi and Hukeri talukas of the Belgaum district and of Maize and Tur in Gokak Canal Tract was very intensive. Series of village demonstrations were held in the interior throughout the division and cultivators were invited to attend them so that they can judge for themselves the merits of standing crops. The nature of intensive propaganda conducted for popularising the improved strains of different crops can be judged from the following example. 37 village demonstrations of paddy strains were conducted and cultivators from not less than 59 villages were invited to attend the same in Dharwar and Kalghatigi talukas and Mundgod Petha of the Dharwar Division alone. Similar propaganda on the same items was done in Belgaum and Haveri divisions. Besides these various crop demonstrations sulphur dusting propaganda against smut in jowar and mangooppers was also equally intensive. The demonstration of stone roller and wheat thresher were continued especially in Bijapur District with good results. In Gadag Division of the Dharwar District, demonstrations of groundnut seed-drill and seed sieves received more attention. In all 40 demonstrations of different improved implements were held in the division. The use of iron ploughs is known to the cultivators all over the division and their demonstrations were limited only to a few in number where they were absolutely needed. Demonstrations of the Poona-furnace and improved method of gull-making were conducted in Chikodi and Hukeri talukas of the Belgaum District and all over Mallad. Spraying potato crop with lime-sulphur wash against the attack of jassids and fumigation of potato seed with petrol against potato-moth were continued to be demonstrated to the cultivators of Belgaum at their own cost. These two operations have become very popular and almost all potato growers have now adopted them. It is very gratifying to note that the potato cultivation which had become very risky owing to these two pests four years back has become safe now. The cultivators are very much pleased to find now that they can control these pests and can grow a successful crop.

(33) Agricultural and Cattle shows were held in 12 places in the Division (3 in Belgaum District, 6 in Dharwar District, 1 in Bijapur District and 2 in Karwar District). The local fair committees continued to take great interest in organising these shows under the guidance of the District Agricultural Overseers and distributed prizes to deserving cattle. During all these shows and at the time of even small demonstrations mentioned in the above paragraph, lectures were delivered on useful agricultural improvements of direct utility to the respective tracts. Village Officers were given demonstrations in Jamabandi meetings held by the Revenue Officers. A big show was contemplated at Chikodi.

Posters and a series of articles 24 in number were published and distributed. A demonstration plot was organised and many exhibits were collected. Due to outbreak of plague however, the show had to be postponed. The demonstration plot was shown to the cultivators on bazar days.

(34) The Rural Uplift work undertaken at Kakhandiki in the Bijapur District with the aid of the donation given by a local gentleman Mr. Shivappa Arli made good progress during the year. The Land Development Committee purchased 12 more iron ploughs during the year and these together with 12 purchased last year were given out on hire to the cultivators of Kakhandiki village. The area ploughed with these 24 iron ploughs came to about 700 acres. Many individual cultivators also purchased iron ploughs and ploughed their lands. It is pleasing to note that an area of about 2,200 acres was ploughed with small iron ploughs in that village. If ante-monsoon rains had not disturbed the ploughing work, still more area would have been ploughed. The Agricultural Chemist gave a plan of drainage for the reclamation of about 100 acres salt affected land and the work is in progress under the guidance of the District Agricultural Overseer, Bijapur. The Garden Committee was able to plan 400 new Mosambi plants in addition to 200 planted last year in its model garden and gave the services of its fieldman to the garden owners for pruning and root-exposing works. This Committee purchased 5 acres of garden area just near the village with a view to erect a small building and plant fruit trees round it. Jayawant cotton was grown on 500 acres as a result of the propaganda done by this Committee. The Educational Committee continued to run the girls' school and gave help to the Agricultural Bias class in all its activities. The Sanitation Committee supplied free medicine to those who were suffering from Malaria and other minor diseases. It is worth noting that this Committee took great trouble to get the villagers inoculated and to induce them to stay outside the village when plague broke out. They controlled the spread of this epidemic very effectively. Land was acquired and 50 manure pits were dug outside the village. Besides these various activities, the Kakhandiki Village Development Saunstha has maintained a good Amrit Mahal Breeding bull and is giving free services to selected cows. The progeny of the Merino ram already introduced there has increased in number and shows signs of good progress. The work done by the Saunstha has been splendid and it shows what can be done in a village where people are willing to help themselves. The success achieved so far is due to the co-ordinated efforts of the officers of the Agricultural Department and the leading men of that village.

(35) *Propaganda against smut on jowar.*—The work was continued through the District Agricultural Overseers, through the Revenue Officers and through the Taluka Development Associations. The District Agricultural Overseers conducted a number of demonstrations on the right method of treating jowar seed with sulphur dust against smut. All the Mamlatdars were requested to dispose off the copper sulphate packets which were still remaining here and there and to take up the

distribution of sulphur packets. The district staff was requested to do intensive propaganda in a few villages by way of actually treating the seed of all cultivators. The results have been satisfactory. The outbreak of smut was only moderate.

(36) *Kanarese Agricultural Magazine*.—The propaganda through the Kanarese Agricultural Magazine was continued and many interesting articles were published in it. The Deputy Director continued to be the Chairman and Mr. V. S. Kulkarni, the Secretary of the Publication Committee. Articles on different sections of the proposed Chikodi Show were published in a special issue of this Magazine. Efforts are being made to attract the attention of the reading public to take interest in Agricultural Development.

(c) *Organisation.*

(37) Agricultural organisation is taking root in the Southern Division especially in the following directions:—

Co-operative Cotton Sale Societies.—The Hubli and Gadag Cotton Sale Societies continued to do good work on extensive scale. These are the only two Societies in the whole of India which are distributing large quantities of pure pedigree seed every year with an organised plan of work to stand by. The Cotton staff of the Agricultural Department is closely helping these two Societies in their work. The Bailhongal Cotton Sale Society has succeeded in removing the boycott of dalals. The Gokak Mills have begun to purchase cotton from the Society. Other Cotton Sale Societies did only small amount of work. The position and work done by different Cotton Sale Societies during the year are tabulated below:—

Name of Society.	Number of members.	Share capital.	Reserve fund.	Number of dokras sold.		Total	Value of Cotton.
				By auction.	By private sale.		
		Rs.	Rs.				Rs.
Hubli	2,633	17,682	21,052	2,513	7,712	10,225	2,67,300
Dharwar	379	5,340	1,464	273	468	741	19,610
Annigeri	208	2,575	2,197	..	483	483	11,958
Gadag	2,156	41,631	50,110	5,395	15,032	20,427	6,00,531
Bijapur	235	3,175	1,123	..	1,118	1,118	29,702

Other Co-operative Sale Societies.—The Nipani Tobacco Sale Society sold jarada worth Rs. 1,596 against that worth Rs. 11,000 last year. Tobacco is sold by the cultivators soon after or even before harvest to the middlemen who prepare jarada and sell it in the Nipani market. The Tobacco Sale Society mainly deals with jarada and as such does not serve the cultivators direct. Cooperative Jarada making is what is needed. Sankeshwar General Sale Society sold different articles worth Rs. 20,557 against those worth Rs. 25,228 last year. The Chilly Sale Society at

Byadgi sold 2,88,400 lbs. of chillies worth Rs. 24,531 and other articles worth Rs. 4,561 against those worth Rs. 33,516 and Rs. 1,000 respectively last year.

(38) *Other Co-operative Societies.*—The Seed, Implement and Manure Societies are not working well as they are too small to maintain efficient staff. The Seed Societies at Devi-hosur and Hosritti did fairly good work while others showed no appreciable progress. Cattle Breeding Societies are realising the benefits derived by introducing pure Mysore bulls and some of them are doing well. The Cattle Breeding Societies at Chelgeri and Sidenur deserve special mention during the year. Benefits of co-operative fencing against wild pigs are recognised by the cultivators all over Mallad but joint action is getting extremely difficult owing to the apathy of the absentee landlords. Legislation to compel the minority is absolutely necessary for substantial progress, as I have repeatedly stated in my previous reports. The Fencing Scheme at Tegur which was pending for a long time on account of 6 persons out of 96 not agreeing is now ready and papers are being submitted for registration of the Society. This scheme is a complete enclosure and protects an area of 1,300 acres. The paddy land coming in the scheme has good perennial water-supply and is capable of growing sugarcane. A large portion of the Mal land is fit to grow groundnut and other valuable crops. The scheme is a very promising one.

(39) *Destruction of prickly pear.*—Digging and poisoning were stopped and only destruction with the aid of cocheneal insects was adopted during the year in Mundargi Petha of the Dharwar District where the work was originally started. There was a demand for these insects from all over the Southern Division and it was met by the Mundargi Mahal Development Association. The Municipalities and District Local Boards took active interests in destroying the prickly pear with the aid of these insects. There were some rumours that these insects attacked some cultivated crops like Brinjal, but on identification it was found that they were mealy bugs and not cocheneal insects.

(40) *Crop Protection Campaigns.*—The campaign against wild deer was continued at Kausa-geri, Belvanaki and Hadagali and an area of 21,731 acres was protected at an expense of Rs. 126 only. In all, 57 deer were killed and a large number was wounded and scared away. The Co-operative Crop Protection Society against wild pigs, started at Turkewadi in the Belgaum District last year, continued its work and efforts were made to organise a gun-club for hunting wild pigs at Arvatgi in Dharwar Taluka of the Dharwar District.

(41) *Spraying campaign against "Koleroga" on betelnut.*—Soon after taking charge of the Karwar District which was added to the Southern Division, I toured in Sirsi, Siddapur, Yellapur, Kumpta and Honnavar talukas where Koleroga on betelnut exists and found that spraying was done nowhere on a large scale. Only an area of 576 acres was sprayed in these five talukas where the area under betelnut extends over 18,100 acres. Efforts were made to pool together all the available sprayers and an area of 800 acres was sprayed against 576 acres last year. With a view

to organise the work on an extensive scale, the Collector of Karwar was requested to give tagavi loans to the cultivators to the extent of Rs. 9,000 for purchasing sprayers and chemicals; and he kindly did the needful. 125 sprayers have arrived from Germany in June which will be made use of in the coming season. Active propaganda was made for undertaking the work on an extensive scale during the coming season by holding 40 meetings and 13 training classes in different centres. Parties of below-ghat labourers have also been organised for upghat talukas where there is no local labour for climbing up the trees. It is hoped that at least an area of 2,000 acres will be sprayed during the coming season. In Sirsi, Siddapur and Yellapur talukas kotte-tying is considered to be better than spraying, but their kottes do not last long. Experiments with Sisal craft were conducted during the year under report. Sisal craft is a tough durable water-proof paper composed of two sheets craft paper cemented together with a double layer of asphalt and re-enforced in both directions with strong unspun sisal fibres. It provides moisture and air-tight membrane. The Sisal craft kottes were observed to prevent the disease completely but the cost is heavy and beyond the reach of ordinary cultivators. Further consideration is being made in the matter.

(42) *Taluka Development Associations*.—There are in all 15 Taluka Development Associations in the Southern Division including Karwar District which has been newly added, 7 in Dharwar District, 4 in Belgaum District, 2 in Bijapur District and 2 in Karwar District. According to the recent classification made by the Divisional Board, 9 are in “A” class and the other 6 are in “B” class. No new associations were organised. Halyal, Bailhongal and Savadatti people have collected good funds and are anxious to form similar associations. The following are the important items of work done during the year by various Associations:—

The Gadag and Ron Taluka Development Associations continued to conduct crop protection campaigns and propaganda for Gadag Cotton Sale Society. They helped the Sale Society in organising its seed depots and induced cultivators to sell their cotton by auction sales held through it. It is pleasing to note that these two Associations and the Gadag Cotton Sale Society are working together with a common aim. The other main works of these Associations were distribution of copper sulphate and sulphur dust packets and demonstrations of wheat threshers and seed sieves. They also attended to the extension of fruit cultivation. The Hangal Taluka Development Association continued to do good work in connection with the spread of selected strains of paddy, sugarcane and sulphate of ammonia and attempted to remove the grievances of the irrigators under Dharma Canal in co-operation with the authorities of the Irrigation Department. The area under Java 213 sugarcane has gone up to 200 acres. The Hirekerur Taluka Development Association attended to cattle improvement by working in co-operation with the Cattle Breeding Societies in 8 villages. The Association also worked for the spread of improved rice strains and did propaganda work for the Chilly Sale

Union at Byadgi. The Haveri Taluka Development Association worked for the spread of Jayawant cotton and Spanish peanut variety of groundnut strain No. 5. The Association helped the District Agricultural Overseer in organising a Horticultural class at Haveri and introduced fruit trees in 6 villages. Bijapur and Indi Associations worked specially for the extension of fruit cultivation on a large scale. They also worked for the destruction of prickly pear with the aid of cochineal insects. The Athani Association helped the Agricultural Department in organising the Cotton Seed Multiplication Scheme for that area and conducted two Cattle shows. The Chikodi Association continued to do good work in connection with the spread of sulphate of ammonia and 675 bags of this manure were sold. The Association has also introduced cochineal insects in 40 villages. A District Agricultural Show was attempted ; but it had to be postponed owing to the outbreak of plague. The Gokak Association paid particular attention to the distribution of Jayawant and Cambodia cotton seeds, sulphate of ammonia and groundnut cake manures. It did also intensive work for introducing Tur as a row crop in Maize and fruit trees in various places. The Mudgod Mahal Development Association continued to work for the spread of Jayawant cotton and held many demonstrations of various implements including Rahats. The Mundargi Mahal Development Association continued to attend to the destruction of prickly pear and worked for the spread of Jayawant and Gadag No. 1 cottons and various fruit trees. The Dharwar Taluka Development Association gave special attention to sulphur dusting of mango gardens and spread of improved rice strains. The Sirsi Taluka Development Association did spraying work against Koleroga in betelnut and propaganda for the spread of rice strains and artificial manures. The Karwar Taluka Development Association worked for the spread of improved rice and sugarcane varieties and also for the spread of artificial manures. Besides these works specially mentioned, all the Associations conducted demonstrations of improved implements and selected strains of crops in co-operation with the District staff of the Agricultural Department. They also continued to do extensive propaganda for copper sulphate and sulphur dust against smut on jowar. The total amount of subsidy given to these Associations was Rs. 7,875 during the year against Rs. 7,729 last year. The work of Taluka Development Associations is gradually being appreciated by the cultivators but their financial position is not yet very sound. Attempts are necessary to collect sufficient funds in good years. The help of the Co-operative Credit Societies in this direction seems necessary and desirable.

(43) *Dharwar District Agricultural Association*.—This Association which was in a moribund condition was revived during the year under report. Debts to the amount of Rs. 3,000 and overdue bills to the extent of Rs. 650 were paid off. A magic lantern lecture was arranged on American agriculture as compared with agriculture conducted in India. The Association held a special meeting of its members and leading cotton growers of the District to consider the bill to provide for the better

regulation and control of transactions in cotton in Bombay and resolved that the bill should be passed into law as early as possible. The Managing Committee and publication committee meetings were held regularly during the year. It is hoped that the Associations will try to be useful to the cultivators.

Wilson Anti-famine Institute.—This Institute at Bijapur continued to do good work in various directions. The depôts sold 154 ploughs worth Rs. 4,764 and spare parts worth Rs. 1,381. Two breeding bulls were purchased—one for Shivayogmandir and the other for Kakhandiki village. The Institute distributed 35 bags of Jayawant cotton seed and sold 578 lbs. sulphur dust worth Rs. 144-8-0. Demonstrations of stone roller and wheat thresher were conducted in all taluka places and also in 3 to 6 villages of each taluka. Destruction of prickly pear was undertaken by the Institute with the help of the cochineal insects. The District Agricultural Overseer, Bijapur, worked as joint Secretary and guided all technical work of the Institute.

(44) *The Divisional Board.*—The Divisional Board of Agriculture held its quarterly meetings regularly and guided the work of the District Officers and Taluka Development Associations. The important subjects dealt with in these meetings were—Marketing of mangoes, adoption of universal standard of cotton, prohibitive tariff against the import of foreign cotton, economic improvement of cotton growers and establishment of sugar factories. The Board held one special meeting to consider the question of providing warehouses and giving long term loans to build the same.

(d) *Direct Services to the public.*

(45) *Field embankments.*—Though the post of bunding officer was retrenched yet one post of the District Agricultural Overseer was utilised for bunding work which has very much developed in the Southern Division. 19 schemes estimated to cost Rs. 11,560 were prepared for 622 acres during the year. Out of these, 7 schemes costing Rs. 5,185 for 125 acres were recommended for tagavi loans and the rest 12 schemes costing Rs. 6,375 for 497 acres were for the owners who had their own money to spend. When demand for expert advice on bunding has considerably increased and when more staff was a pressing need, the retrenchment of the existing post was a severe blow to the progressive work. Bunding is the major agricultural improvement for major portion of the Bombay Presidency and it requires special consideration by the Director of Agriculture and Government. Its work in the Southern Division was much appreciated by the cultivators; but its growth has now been crippled. Attempts are being made to train the District Agricultural Overseers in bunding but they get little time to devote any attention to this important subject.

(46) *Work of the Mechanical Assistant.*—There were 24 applications during the year for plans and estimates of pumping plants and all of them were dealt with. Seven pumping plants were erected—one in Dharwar District, four in Belgaum District and two in Bijapur District.

Demand for erecting pumping plants has increased specially in Belgaum and Bijapur Districts. The Mechanical Assistant continued to be fully busy. In addition to above works, he attended to the repairs of the machines working on Gokak and Dharwar Farms and at Devi-hosur school. He also repaired cane crushers and pumping plants in the Division. He laid out 900 feet pipe line on Gokak Farm. His work has been very useful.

(47) *Karjagi Fodder Storage*.—The stacks were repaired where necessary. Enquiries were made with a view to dispose off the fodder but there was no demand from any part of the Division as the season was very good for the growth of all kinds of fodder. Two auction sales were arranged, but nobody came forth to bid. The machinery was attended to and kept in order.

(48) *Tractor Ploughing*.—The work of tractor ploughing for the removal of hariali, a deep rooted weed, was continued by the Burmah Shell Company under the guidance of the Agricultural Department which canvassed the required area at fixed rates and inspected the quality of work done. An area of 800 acres was canvassed at Shiggaon centre to start with; but it had to be rejected owing to excess of moisture in the soil. An area of 800 acres was then canvassed round Meundi and 700 acres round Beldhadi and Huilgol in Gadag Taluka. Of the total canvassed area of 1,500 acres, tagavi loans were sanctioned for 682 acres and the area actually ploughed was only 207 acres. There were considerable breakdowns and a good deal of time was wasted in repairs. The problem of removing the hariali up to a depth of 12" remained unsolved. The two ploughs for 12" ploughing arrived late in February. One of them was got made in Satara Works and the other was Ransomes' 16" cut implement specially built for Burmah Shell and Co. They were observed to be too heavy for 22/36 MacCormic Deering Tractor. What is needed is a suitable set of tractor and ploughs to achieve a clear 12" depth work in deep black soil. A good deal of land is affected with hariali in the Southern Division and manual and bullock power is too insufficient to deal with it. Hand digging is a very slow and sometimes costly operation. Bullock power iron ploughs are used to a certain extent for the removal of hariali up to a depth of 10"; but the number of bullocks available for the purpose is too limited to do any extensive work. The land affected with hariali more than 10" deep cannot be dealt with by bullock power and hence there is a considerable scope for tractor ploughing. A scheme has been submitted to the Imperial Council of Agricultural Research.

(e) *Agricultural Education.*

(49) The Vernacular Agricultural School, Devi-hosur, completed its 19th year and it was continued to be managed by the only one graduate assistant. 81 applications were received for admission against 92 last year and only 12 students were admitted. Out of these 12 students, two were admitted without any scholarship and 10 with a reduced scholarship of Rs. 5 per month. 12 students in the first year and 16 students in the 2nd year received education in the school during

the year. Results of annual examination continued to be very satisfactory. 10 students out of 12 in the first year and 14 students out of 16 in the 2nd year passed. In all 24 passed out of 28. 4 came in the first class in the first year and 7 in the 2nd year. The number of past students of Devi-hosur School to-day is 251 and it is gratifying to note that 137 students are reported to have taken to private farming. 19 students attended the Annual Social Gathering of the School with reports of work done in their farm and cultivation sheets for discussion. Some past students are doing very good work and their farms are serving as demonstration farms to the neighbouring cultivators. The health of the students continued to be very good. The boarding charges were very moderate, the average being Rs. 6-14-8 per month. The distinguished visitors to the School were Dr. W. Burns, the Director of Agriculture, Bombay Presidency, Poona, and Mr. D. Symington, the Collector of Dharwar, and they have left very good remarks. The total expenditure of the School during the year was Rs. 8,234 as against Rs. 10,439 last year and the total receipts amounted to Rs. 1,284. All possible attempts were made to reduce the expenditure of the school during the year under report with considerable success.

(50) Examinations of all the 23 Agricultural Bias Classes were continued to be conducted by the District staff of the Agricultural Department and the Head Master of the Devi-hosur Vernacular Agricultural School. With increasing number of these classes, the work of examining the students is much increasing and I must reiterate again that the District Local Boards should be advised to have their own examining staff. I should again like to suggest that the District Local Boards should be advised to select rural areas suitable for agricultural bias education, and convert all the existing schools there into agricultural bias classes and concentrate supervision by appointing suitable supervisors. These classes are at present very much scattered and they do not receive proper supervision and guidance. I must also again point out that the training given to the teachers for 10 months at Devi-hosur Vernacular Agricultural School is not enough. A separate training school is a need.

(f) *General.*

Other important events of the year were as under :—

(51) The Deputy Director of Agriculture worked for the Cotton Contract Bill at Poona and attended various meetings of the Taluka Development Associations to explain the object of the bill and to take their opinion on the same.

He gave evidence before the Reorganisation Committee. He attended Crop Research Committee meeting of the Department in Poona, the Railway Board meetings at Bangalore and Hubli, and Forest Committee meeting at Dharwar. The important move made by the Forest Committee is to start Gun-clubs against the attack of wild pigs in Mallad. The Deputy Director was asked to prepare a Scheme. The Deputy Director attended two meetings held by the Director of Agriculture at

Poona and one meeting held by the Collector of Dharwar in connection with Tractor-ploughing. He worked closely with Burmah Shell Company in this connection. He also prepared a scheme for submission to the Imperial Council of Agricultural Research.

The Deputy Director toured twice in Karwar District and attempted to organise spraying and Kotte-tying work against Koleroga on betelnut in co-operation with the Collector of Karwar. He went with the Plant Pathologist to Bangalore to hold discussions with Dr. Coleman, in connection with future research on Koleroga disease and helped the Plant Pathologist to put up a scheme to the Imperial Council of Agricultural Research.

(52) The Hubli and Gadag Cotton Seed Multiplication Schemes were discussed in a meeting held at Poona by the Director of Agriculture and proposals for modification were submitted to the Indian Central Cotton Committee, Bombay.

(53) The 14th Divisional Conference of the officers of the Agricultural Department in the Southern Division was held at Dharwar and various subjects were discussed.

(54) The Director of Agriculture toured for two weeks in the Southern Division and inspected various institutions and District work of the Department. He gave special importance to the work in connection with Jayawant and Gadag No. 1 cottons round Hubli and Gadag, work on Koleroga in Karwar District and possibilities of sugar making in Belgaum District. He made many valuable suggestions in numerous meetings held during his tour.

(55) The Principal of the Agricultural College and the Professor of Agricultural Engineering took special tours in the Southern Division to inspect bunding works and the Deputy Director had to accompany them. The Agricultural Chemist to the Government of Bombay inspected salt-affected lands at Kakhandiki in Bijapur District and gave plans for their reclamation. The Deputy Director of Agriculture had to go with him. The Soil Physicist to the Government of Bombay took tours twice in Bijapur District to inspect the dry farming experiments conducted there and to select a site for the proposed research station for dry farming. The Director of Agriculture also inspected the sites selected at Bijapur and the Deputy Director was required to be present on all these occasions.

(56) The Honourable Divan Bahadur S. T. Kambli, Minister for Education and Agriculture, toured in Bijapur and Dharwar Districts and inspected various works of the Department. He opened the Agricultural Show organised along with Co-operative Conference at Bagalkot.

(57) His Excellency the Right Honourable Sir Frederick Sykes, P.C., G.C.I.E., G.B.E., K.C.B., C.M.G., the Governor of Bombay, visited Karwar, when a small exhibition of garden crops was arranged in honour of his visit. I was given an interview when I explained to him the work of spraying against Koleroga.

(58) The activities of the Agricultural Department in the Southern Division continued to extend. The work in connection with Hubli and Gadag Cotton Seed Multiplication Schemes and that in connection with tractor ploughing continued to be more complicated and demanded much attention of the Deputy Director of Agriculture. The new work of Karwar District especially that on Koleroga was very exacting. The growing work in various directions could not be curtailed and the staff had to work with limited funds at their disposal under continued retrenchment. All the members of the staff excepting very few continued to do good work. Many Revenue Officers and private gentlemen continued to help our agricultural propaganda and organisation work and my thanks are due to them. I must make a special mention of the names of Mr. R. S. Hiremath, the acting Collector of Karwar, Mr. D. Symington, I.C.S., the acting Collector of Dharwar, and Mr. K. V. Kaundinya, District Deputy Collector, III Division, Dharwar, for the year under report. The disturbed political atmosphere had no effect on the progress of our work ; but continued fall in prices of all agricultural produce has discouraged the cultivators to a great extent. It is hoped, however, that this situation may not last long.

S. S. SALIMATH,

Deputy Director of Agriculture,
Southern Division, Dharwar.

**Programme of work under the Deputy Director of Agriculture,
Southern Division, Dharwar, for the year 1933-34.**

RESEARCH AND EXPERIMENTS.

(1) *Cotton Breeding Work*.—Selfing Jayawant and Gadag No. 1 cottons will be continued for multiplication of seed required for Hubli, Athani and Gadag centres. Different varieties of cotton will be tested for wilt resistance under rigid laboratory and field conditions and the most resistant strains isolated. Testing and selection in Jayawant $\times$ 15, Jayawant $\times$ Comila, Dharwar No. 1 $\times$ Comila, Dharwar No. 1 $\times$ Million Doller, Dharwar-American Ron 2 $\times$ Gadag No. 1 and Dharwar-American Ron 2 $\times$ Co. 2 will be continued. Seed testing and sulphur dusting experiments as well as investigations on "small leaf" disease will also continue to receive attention.

(2) *Jowar breeding work*.—Fulgar yellow, Fulgar white, Nandyal, Bilichagan and Savaner selected strains of jowar will be maintained by selfing and will be grown on Dharwar farm on a small scale to meet the needs of the cultivators.

(3) *Groundnut breeding*.—Spanish peanut variety of groundnut strains No. 5 will be grown on the farm to produce seed for distribution in the District. Selection in Pondichery variety will be continued.

(4) *General experiments on Dharwar farm*.—Under crop experiments, jowar, cotton, wheat, tobacco and gram varieties will continue to be compared. Under manurial experiments, sulphate of ammonia will continue to be tested on cotton and jowar. San green manuring and farm yard manure experiments will be repeated. The two and three year rotation experiments, groundnut and cotton experiment in alternate rows and seed rate experiment on groundnut will also continue. Poultry breeding will be newly taken up on Dharwar farm.

(5) *General experiments on Gokak farm*.—Under crop experiments, sugarcane, cotton and tobacco varieties will receive major attention. Under manurial experiments, artificial manures on sugarcane will be continued. Selection in Maize and fruit gardening will also receive increased attention.

(6) *Rice Breeding work*.—Selected strains of Mugad and Antersal varieties of paddy will continue to be multiplied on Mugad farm. Work on Kolumba cross will be discontinued. Selection in Dodagya variety of paddy will receive major attention. The work on Gonag will be continued.

(7) *Experiments in Cultivators' field*.—Selected strains of cotton, jowar, paddy, tobacco, wheat, sugarcane and groundnut will be compared with local in suitable places of the Division. Sulphate of ammonia and Bone meal will be tested on paddy crop. Dry farming experiments on holding scale will be continued in Bijapur District.

Propaganda.

(8) Demonstrations of improved implements especially wheat thresher, stone roller, groundnut digger, improved seed drill and tractor ploughing will continue. Demonstrations of successful crop experiments in Government farms and in cultivators' fields will be held as usual. Spread of Jayawant and Gadag No. 1 cottons will receive greater attention. The work of issuing licences will be continued at Dharwar, Gadag, Bagalkot and Nargund. All existing check stations and a few new ones added will be inspected and attempts be made to stop all illicit import of inferior cotton into the protected areas of the Southern Division. Sangli and Jamkhandi States have also agreed to make arrangements for necessary inspection. Spanish peanut variety of groundnut strain No. 5 will be multiplied and distributed round Dharwar, Haveri and Bailhongal. The spread of Nadiad No. 6 variety of tobacco will be limited to a few places where it is appreciated. Bunding work will receive as much attention as possible, though the post of the Bunding Officer is abolished. The fencing work will receive more attention during the coming year. Agricultural shows and conferences will be held in suitable places. The proposed Chikodi Show will receive special attention. Village officers will continue to receive instructions at the time of Jamabandi meetings. Lectures and demonstrations will continue to be held in Co-operative Training classes. The intensive propaganda on sulphur dust against smut will continue. The rural uplift work at Kakhandiki will not fail to get the attention due to it.

Organisation.

(9) Our close work with the Cotton Sale Societies will be continued. Cattle Breeding Societies will be inspected from time to time and advice will be given when needed. There is little scope for small seed, implement and manure societies. Some credit societies have been selected through which improved seed, implements and manure will be distributed. Joint fencing scheme on hand will be executed and attempts will be made to organise more. Removal of prickly pear against wild pigs in Mundargi Petha and crop protection campaigns against deer in Gadag and Ron talukas will be continued. Gun-clubs for hunting wild pigs in Mallad will be organised. Taluka Development Associations will be guided to work according to the programmes drawn for them. The Dharwar District Agricultural Association and the Bijapur Wilson Antifamine Institute will continue to receive close guidance.

Direct services to the public.

(10) *Field Embankments.*—The progress of this work is much hindered as the post of the Bunding Officer is abolished. The District Agricultural Overseers will be trained to do this work as far as possible without neglecting their other works.

(b) *Boring work.*—This will continue to be suspended until further orders from Government.

(c) The Mechanical Assistant will be engaged mainly in erecting pumping plants and power cane crushers. He will inspect all Farm machinery and will attend to their repairs.

(d) All Copper sulphate packets on hand will be distributed and sulphur dust packets will be ordered for distribution against smut on jowar.

(e) Work of spraying against Koleroga on betelnut will be undertaken on an extended scale.

(f) Tagavi loan applications for various agricultural improvements received through the Revenue Officers and Co-operative Societies will be attended to.

(g) Examinations of Agricultural Bias classes will be conducted as usual.

(h) Inspection of individual farms for technical advice will be limited only to deserving few cases.

S. S. SALIMATH,
Deputy Director of Agriculture,
Southern Division, Dharwar.

APPENDIX F.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF AGRICULTURE, GUJARAT, SURAT, FOR THE YEAR 1932-33.

I—Staff.

I was in charge of the Division throughout the year.

2. Mr. G. P. Pathak held the charge of the office of the Cotton Superintendent, Surat, vice Mr. Nagarsheth reverted to his original post.

3. The post of the Divisional Superintendent of Agriculture, Northern Division, Ahmedabad, was abolished and Mr. K. B. Naik, the Divisional Superintendent of Agriculture, Northern Division, was made to retire.

II—Season.

4. The monsoon started with light rains by the end of June, but there were general rains in Gujarat in the first week of July. In July the rains were heavy, rains in the first half of August were heavy except in Surat and Broach.

September-October rains were just sufficient in South Gujarat, but in the North, they were insufficient, which adversely affected the cereals and also the Rabi crops.

In South Gujarat the Cotton and Jowar crops yielded exceptionally high, but the Rabi crops and Rice were below normal. The ginning output of cotton was also high.

III—Research and Experimental Work.**(I) CROP BREEDING.***Surat.*

5. *Cotton*.—Five types were tested in two Latin squares of five each, the area of each plot was 1.1 gunthas. The results show that in Kapas yield, Selection 43 tops the list, while 1027 A.L.F., and Surat 5¹ are at the bottom.

In lint yield, IA Long Boll tops the list with Selection 43 about its equal and Surat 5¹ and White Flower coming next, with 1027 A.L.F. at the bottom.

In both the Latin squares separately, none of the types is significantly superior to the general mean, but if both the squares are combined, Selection 43 is just significantly superior to the general mean but it gins 2.4 per cent. less than IA Long Boll.

It may be noted that this year 1027 A.L.F., White Flower and Selection 43 are nearly equal in staple length and fineness, though White Flower is the best. As White Flower has immature hairs, it gives nappier yarn, though the counts are high.

Surat 5¹ will be dropped from future trials.

6. *Crosses*.—The cross IA Long Boll $\times$ 1027 A.L.F., is the most hopeful, as the cultures show the desired characters of both the parents.

7. *Selection work in Cotton*.—23 selections made from the crop of Local seeds collected from all over the Surat tract will be studied further.

8. *Seed production—Cotton*.—232.5 lbs. of selfed seed of 1027 A.L.F. and 41 lbs. of IA Long Boll were produced.

9. *Jowar*.—42.5 lbs. of selfed seed of Budh Perio 53 was produced.

10. Bardoli Local again yielded equal to Budh Perio 53, on a small scale, but has better colour and harder grain. It will be tried with Budh Perio 53 for yield.

Broach.

11. *Cotton*.—Cotton Breeding work is now carried out by the Cotton Breeder, Broach; Scheme is financed by the Indian Central Cotton Committee.

12. The problem is being tackled by (a) Selection from Local, (b) building up a desired type from crosses and (c) evolving a cent per cent. resistant type, by selecting from the resistant types grown under best wilt conditions, artificially produced.

13. 100 fresh selections have been made from the crop of 100 samples of seeds collected from the Naramda-Mahi zone. The selections were healthy, but it may be noted that the wilt incidence was comparatively less during the year. Promising crosses will be studied further. Some 29 plants of B.D. 8 which withstood the attack of wilt will be transplanted and the seeds from the produce will be re-tested.

14. *Breeding work in Rabi Jowar and Wheat*.—This is now under the charge of the Farm Superintendent, Broach.

15. *Rabi Jowar*.—Selections mentioned in paragraph 21 of last year's report are continued. Some fresh selections also have been made.

16. *Replication tests*.—Nos. 8 and 10 were compared with Local in six random replications, both of them gave superior yield over Local. No. 12 will be dropped from the next year, as it lodges badly and has got slightly smaller grains. No. 2A which is promising will be tested in replications.

17. *Wheat*.—With an object to make preliminary selections for high yielding hard red and hard white types suitable for the Bhal tract, 190 selections have been made from the crop of 347 samples collected from Ahmedabad, Broach and Panch Mahals. Out of 190 selections, 131 are hard white and the rest are hard red Wheats.

Nadiad.

18. *Tobacco—Replication trials on dry tobacco*.—Gandiu 6, Piliu 45 and 28 and Adcock were tested in four random replications, the area of each plot was 0.94 gunthas.

Adcock was added to judge its suitability for the tract as a dry crop ; however it is found to be particularly delicate in seedling stage and is low yielder and is not likely to be suitable for the Local market in smoking quality.

Gandiu 6 is significantly superior to all and between the rest, there is no significance.

19. *Yield trials under irrigation.*—Piliu 28 and Piliu 45 were tested in four random replications, along with three other types, viz. Gandiu 6 and two cultures from the crosses N-1-5 and N-4-6. Area of each plot was 0.88 gunthas. None of the two Piliu types is significantly superior to the other. Piliu 45 was earlier by seven days.

20. N-4-6 is poorer in yield than Gandiu 6 and N-1-5 yielding equal to Gandiu 6. N-1-5 is sweeter than Gandiu 6 and it is to be seen, if it be strong enough for Local market, which will be tested next year on a bulk scale.

21. *Yield trials with cigarette tobaccos.*—N-10-3, N-10-7, Gandiu 6, Adcock and Hester were tested in five random replications, the area of each plot being 1 guntha.

Hester gave the lowest yield, Adcock next, both significantly less than Gandiu 6, N-10-3 and N-10-7. The quality of N-10-3 requires further bulk testing as the Company which purchased last year at $5\frac{1}{2}$ to 6 annas a lb., offered only two annas per lb. this year.

22. *Purifying the hybrids and New hybrids.*—The cultures N-1-5-2 and N-10-3-1 may be said to be practically pure.

The culture II-2-2, now practically pure is considered good in smoking and flavour. It will be tested for yield and quality.

23. *Growing cigarette tobacco.*—(a) Nipping at about 20 leaves per plant gives the proper thinness required for cigarette tobacco.

(b) A fairly bright coloured leaf suitable for mixing for cigarettes is produced by a slight change in the Local method of curing, but the tobacco contains a higher percentage of nicotine. A small lot of this was sold at 0-6-0 per lb. to a new customer.

24. *Bajri Breeding at Nadiad.*—185 selections from last year were grown for further selection under continuous selfing. Ten of these cultures show purity for important characters. Some cultures also show better yield.

Three of these cultures were tried in four randomised replications with Local, the area of each plot was one guntha. All the three yielded more than Local by 14 to 22 per cent. but this difference is not significant.

25. *Castor work.*—The work was shifted to the Government Farm, Kamla (Nadiad), as the Prantij soil was very variable.

Ten cultures were tried in five random replications along with Kaira and Prantij Locals, as a Kharif crop sown 4' × 4'. As a result of this four promising cultures, viz. S-2, S-5, S-9A and S-20 which are nearly

equal to Kaira Local and significantly superior to Prantij Local will be tested further.

As regards oil content, S-5, S-9A and S-20 are superior while S-2 is equal to both the Locals.

26. The replications with the above types were also carried out under closer spacing, viz., $4' \times 2'$ in five blocks. The results from four blocks were vitiated and of the fifth block, confirmed those of wider dibbling, that the four types were the best. Thus the tests will be repeated next year on uniform soil with these four types and two Locals.

Viramgam (Ahmedabad District).

27. *Cotton*.—Five cultures of the cross Wagad 8×1027 A.L.F., along with Wagad 8 and Local were tried in five random replications, each plot being 1.93 gunthas. The results show that the yield of Wagad 8 is significantly superior to all others. The hybrids have high ginning. Further trials are necessary. Under Mill conditions the spinning of the cultures is found to be equal to Local though they have been valued by Local Grader at Rs. 15 more per Khandi.

28. Selection 26-2-1 which gins equal to Wagad 8 for the last three years and gave $24\frac{1}{2}$'s against 18's of Wagad 8, will be tried for yield next year.

29. *Spacing Experiment for Cotton*.—This experiment has been carried out for the last three years and the results show that wider sowing gives as much yield as narrow sowing, and if adopted it may facilitate better cultivation and reduce cost of weeding and increase yield as in Surat tract.

30. *Jowar*.—Six selections of Chhasatio and 5 of Utavli have been retained for further study. These selections have been made only from mid-rib colour character and no other character has been studied. It is observed that there is visible difference in ear-head within the progeny of some cultures and thus the yield tests without the purity, are of very little use.

(2) EXPERIMENTAL STATION WORK.

(a) *Surat Agricultural Station.*

31. *Seed multiplication*.—Cotton 1027 A.L.F. was grown on 57 acres and 13 gunthas giving 697 lbs. of seed cotton per acre, which is the record yield on the Farm. 22,659 lbs. of resultant seed was distributed in the selected villages of the Surat Seed Groups for further multiplication and distribution.

32. *Jowar seeds*.—Budh Perio 53 was grown on 66 acres and 24 gunthas giving 1,274 lbs. of grain per acre, which is also a record yield on the Farm. 6,567 lbs. of this seed was distributed in the Surat tract.

33. *Cotton variety trials*.—1027 A.L.F. and Selection IA Long Boll were tried in six replications according to Students' method each plot being 8.73 gunthas. The latter has yielded 4.7 per cent. more, but the results are not significant.

34. *High ridges vs. Low ridges*.—This experiment has been recast. There were three treatments as given below :—

- (1) Sowing on flat.
- (2) Sowing on low ridges prepared by country harrow in summer 3 to 5 inches high.
- (3) Sowing on high ridges prepared by repeated use of Disc harrow in summer 6 to 8 inches high.

Cotton was dibbled 4' × 2' in all cases. Interculturing was not uniform this year but in future it is to be done with McCormic Cultivator and harrow in all cases. The treatment was randomised into five replications each plot being 3.5 gunthas.

During the year crop on ridges gave better germination. Flat having 64.4 per cent., Low ridges 92.1 per cent. and High ridges 92.3 per cent. germination out of the total number of dibbles.

The yield results are not significant between any two treatments.

35. *Manurial Experiments*.—This is a new experiment laid out to see how far the findings of the Cotton Physiological work can be further confirmed. There are eight treatments randomised into five blocks, the area of each being 2.02 gunthas. The results are as under :—

Treatments.	Yield per acre in lbs. of seed-cotton.
1. No manure (Control)	732.8
2. 10,000 lbs. of Farm yard manure once in 6 years.	801.3
3. 40 lbs. Nitrogen in the form of Sulphate of ammonia at sowing.	815.76
4. 20 lbs. Nitrogen in the form of Sulphate of ammonia at sowing.	695.09
5. 10 lbs. Nitrogen in the form of Sulphate of ammonia at sowing.	710.82
6. 40 lbs. Nitrogen in the form of Sulphate of ammonia after stand in August.	809.32
7. 20 lbs. Nitrogen in the form of Sulphate of ammonia after stand in August.	764.77
8. 10 lbs. Nitrogen in the form of Sulphate of ammonia after stand in August.	754.87

No treatment gives significant increase over control or Farm yard manure treatment though 40 lbs. Nitrogen given both ways gives

significant increase in yield over 20 lbs. Nitrogen at sowing. Increase in yield of seed-cotton comes to 1·5 to 2 lbs. per lb. of Nitrogen as against 4 to 5 lbs. obtained by Mr. K. V. Joshi. Higher amount of Nitrogen does not increase the yield proportionately. Increase in yield does not pay even half the extra cost of manuring.

36. *Spacing Experiment.*—This is also a new experiment laid out during the year under report. There are ten treatments randomised into five blocks. The area of each plot is 3·63 gunthas. The results are as under :—

Treatments Dibbled.					Yield of seed cotton per acre in lbs.
3' × 3'	..	..	..	..	629·42
4' × 3'	..	..	..	..	618·31
4' × 2'	..	..	..	..	674·41
5' × 2'	..	..	..	..	639·76
6' × 2'	..	..	..	..	677·38
Drilled					
3' × 3'	..	..	..	..	658·02
4' × 3'	..	..	..	..	665·06
4' × 2'	..	..	..	..	646·58
5' × 2'	..	..	..	..	623·70
6' × 2'	..	..	..	..	657·36

Required spacing is obtained in drilled plots by thinning 3 and 6 weeks after drilling. The results are not significant between any two treatments.

37. *Jowar spacing and its effects on fodder and grain.*—There were two treatments and six replications according to Student's method. The area of each plot was 3·9 gunthas. The results are as under :—

Treatment.				Actual spacing average.	Yield per acre in lbs., grain.	Yield per acre in lbs., fodder.
1.	Six inches thinning	..	..	8·3"	918·33	1,453·33
2.	Twelve inches thinning	..	..	13·8"	988·33	1,413·33

The results are not significant both for grain and fodder. There is practically very little difference in size of grains and yield of fodder.

38. *Miscellaneous trials.*—Green manuring—Dhaincha or Ikad was again tied in strips in cotton.

The results were as under :—

Treatment.	Green stuff buried in lbs. per acre.	Seed rate of Dhaincha per acre.	Yield of seed cotton per acre. in lbs.
1. Cotton drilled 6' apart with Dhaincha 1' wide between two rows of cotton.	5,155	52.5	660
2. Cotton drilled 6' apart without Dhaincha	....	....	787.5
3. Cotton drilled 6' apart with 5 cart-loads poudrette per acre with Dhaincha.	7,779	68.1	845
4. Cotton drilled 6' apart with 5 cart-loads poudrette per acre without Dhaincha.	....	....	941
5. Cotton drilled 5' with Dhaincha 6" wide between two rows of cotton.	7,695	47.5	788.75
6. Cotton drilled 5' without Dhaincha ..	....	....	765
7. Cotton drilled 4' with one row of Dhaincha between two rows of cotton.	3,845	11.2	852.5
8. Cotton drilled 4' without Dhaincha ..	....	....	678.75

The plots were in duplicate having check for each treatment. Dhaincha was sown along with cotton and buried after about a month.

39. *Surat Dairy*.—The strength of the herd on 1st April 1933 was 82 as against 88 of last year. The health of the cattle remained quite good.

Out of 21 bull-calves transferred to Chharodi for rearing, 8 bulls were brought back, six being from Surat and two from Chharodi lot. Seven of these have been issued as premium bulls during the year and one is left on hand. Again a second lot of 12 bull-calves have been transferred to Chharodi for rearing.

The total realizations from the Dairy produce during 1931-32 and 1932-33 were as under :—

Year.				Total milk yield.	Total realiza- tions.	Quantity per rupee.
				Lbs.	Rs. a. p.	Lbs.
1931-32	..	..	..	89,557	6,838 1 4	13.097
1932-33	..	..	..	85,522	6,584 0 0	12.99

(b) Broach Farm.

40. *Manurial Experiments with Cotton.*—The object of this experiment is to find out a substitute for the Farm yard manure.

The treatment and results are as under :—

Treatment.	Yield of seed-cotton per acre in lbs.
A. 8 Cart-loads Farm yard manure per acre once in 2 years	534·7
B. Sann Green manure in 1' strip between rows of cotton 6' apart. Sann to be buried in first fortnight of August	506·9
C. Sann as in " B " with 10 lbs. Nitrogen in the form of sulphate of ammonia to be applied at sowing	555·9
D. Control (no manure)	502·5

Only " C " is significantly superior to Control " D ".

(c) Dohad Farm.

41. This is mainly a seed farm. The following seed supply was made during the year to the Co-operative Societies to multiply seed for further distribution :—

Name of seed.	Quantity in lbs.
1. Maize	6,700
2. Spanish Peanut	984
3. Pusa 4 wheat	7,900
4. Gram.	380
5. Jirasal rice	147·5
6. Anklo rice	45

There was a seed-drill class for Bhil cultivators and 96 attended it, out of whom 3 actually used drill for sowing Maize.

IV—Propaganda.*Ahmedabad District.*

42. *Trials in cultivators' fields.*—Wagad 8 was tried at different places like last year. It has yielded 7 to 20 per cent. more in 15 cases out of 17 trials than Local and its ginning is 2 to 4 per cent. more than Local Wagad. Hence there is a large demand of seed of Wagad 8 in these places. There is about 3 lacs of acres of soil suitable for Wagad 8 in Ahmedabad District and the Department is making some preliminary

trials with a view to launch a big seed production and distribution scheme for the tract. Under this arrangement selfed seed of Wagad 8 is now being multiplied on an area of 25 acres. 6,160 lbs. of seed produced is distributed amongst registered seed growers to grow over an area of 200 acres in Chor-Vadodra centre.

43. *Wheat*.—Strain 224 was grown on 175 acres in Bhal tract, and on 18 acres in Viramgam. It is better than Local, but its grains being comparatively brownish, it is not liked by the cultivators of Bhal. It is to be seen how it is liked in Viramgam.

Strains Nos. 808 and 809 were tried in Dholka and Viramgam but results were not favourable.

44. *Paddy*.—Strain 184 was tried in 12 places in South Daskroi and it has yielded equal with Utavli but less than Sutarsal and hence it is not likely to replace the prevalent local variety, Sutarsal.

45. *Sugarcane*.—CO. 213 was tried in Dholka and found promising. Further trials are necessary.

46. *Jowar for fodder*.—Bhal tract imports Rabi Jowar seed from Sholapur every year for fodder crop. Broach types were tried instead and found more promising than Sholapuri.

47. *Cultural trials with Cotton and Wheat*.—Wider sowing trials were made at Tagadi and Viramgam as they are likely to increase yield by improving cultivation. The trials were not conclusive and hence further trials will be taken.

48. *Manvrial trials*.—40 lbs. of sulphate of ammonia per acre on Jowar fodder in Dholka and Groundnut in Prantij Taluka was tried and the results are promising. 112 lbs. of sulphate of ammonia alone per acre, and half of it replaced by Groundnut cake was tried on paddy in Matar and South Daskroi talukas. Both have given better yields than no manure (Control) plots. Further trials are necessary.

49. *Trials with Wheat Thresher*.—The Sind Norag with 19 discs, Olpad Thresher with 9 serrated discs, bullock and cart threshing were tried at Tagadi in Bhal tract. Norag is best and next comes Olpad Thresher; Olpad being cheaper and lighter arrangements are being made with the Agricultural Engineer to design a Thresher combining the good points of both, and on the pattern of Olpad Thresher.

50. *Demonstration and Shows*.—At the time of Vautha fair in November in Dholka Taluka, a demonstration on sugarcane (CO. 213) trial plot was held and about 1,000 people visited the plot.

Panch Mahals District.

51. *Trials in cultivators' fields*.—Pusa 4 Wheat was tried with the Local in Jhalod and Godhra talukas and it has been found superior.

52. *Cultural trials*.—Sowing of Wheat 15" drill versus 12" with a plough gave better yields in Jhalod Taluka.

53. *Manurial trials*.—Sulphate of ammonia in different doses on Paddy and Bavto in Godhra and Kalol talukas has increased the yield considerably. Sulphate of ammonia and Groundnut cake on Maize in Dohad and Jhalod talukas have increased the yield but they do not pay economically and hence the trials will be discontinued.

54. *Sugarcane*.—CO. 213 has become popular in the District and it is now grown in 52 villages with an area of about 350 acres. Improved furnace and Poona pans are introduced by almost all. During the year 36 new cane-crushers and 40 Poona type Gul pans were introduced.

55. *Gul-making demonstrations*.—These were conducted at 9 places and as a result better type of Gul is now made.

56. Seed Drill training classes were conducted at 9 centres in Dohad Taluka for four days at each place. 45 cultivators were trained, about 110 attended the classes, and as a result about 30 are going to sow with a Drill. Besides 18 implement demonstrations were conducted in Dohad Taluka. 172 acres and 30 gunthas were worked up with implements like B.T. 2., Meston ploughs and harrows.

57. *Seed distribution*.—Magadi variety of Groundnut is being taken up in Western Mahals instead of Big Japan and 190 acres were sown under this type.

58. *Pests*.—155 Sulphur dust packets were sold for treating Jowar seed against smut. 148 White Arsenic packets were sold at Garbada and Salia for use against rats damaging Wheat and Gram crops.

Kaira District.

59. *Trials in cultivators' fields*.—Wider sowing has been appreciated by cultivators as it has definite advantage for cultural operations and as a result about 30 bighas of Bajri, Kodra and Til-Tur mixtures and Bavto were sown 18" apart against 12" Local and about 20 bighas Cotton dibbled 36" × 36" against 27" drilling in Matar Taluka.

60. *Manurial trials*.—56 lbs. of sulphate of ammonia per acre on Bajri in Nadiad Taluka, and on Bavto and Kodra mixture in Matar Taluka was tried at different places. Bajri yield was increased from 16 to 25 per cent., Bavto 15 to 37 per cent. and Kodra mixture 22 to 50 per cent.

112 lbs. of sulphate of ammonia on dry and irrigated rice in Matar and Kapadvanj talukas, respectively, increased the yield from 22 to 28 per cent.

61. *Seed distribution*.—77 lbs. of Tobacco Gandiu 6 and 74 lbs. of Piliu 28 seed were supplied in the District through Taluka Development Associations.

62. *Sulphur dusting against Jiru Mildew*.—Sulphur dusting demonstrations against Jiru Mildew were carried out in 11 villages of the District. In all 30 acres were dusted at the rate of 20 lbs. per acre. This crop yielded about 40 lbs. more per acre than untreated crop and realized Re. 1 more per 40 lbs., because of the disease free quality.

Even though the attack of disease was late and mild at the cost of Rs. 2-6-0 per acre, Rs. 8 to 10 more were realized.

63. *Horticultural propaganda and service.*—The following fruit trees, grafts etc. were supplied through the agency of the Department :—

Mosambi	..	..	..	1,100 plants.
Chikoo	..	..	..	47 "
Mango grafts	..	..	..	92 "
Plantain suckers	..	..	..	2,050 "
Grapes	..	..	..	200 "
Guava	..	..	..	84 "
Figs	..	..	..	100 "
Papaya seed	..	..	..	4 lbs, 6 ozs.
Guava seed	..	..	..	12 ozs.

11,480 lbs. of denatured salt was supplied to Mango growers in the District.

Budding of Bor and Mosambi, and pruning of Grapes and Guavas was done at several places in the District. The Horticultural Assistant visited about 25 Mosambi and Chikoo plantations and gave necessary help on the spot in the management of the gardens.

Broach District.

64. *Trials in cultivators' fields.*—B.D. 8 cotton was tried with Local for wilt resistance both in Goradu and Black soils. In Goradu both cottons were affected equally with root-rot but in Black soil B.D. 8 was affected by wilt (*Fusarium*) to the extent of only 1 to 1·5 per cent. whilst the Local 3·5 to 30·5 per cent.

65. *Rabi Jowar.*—No. 12 and No. 8 were tried in the District with Local, but not found much superior ; so cultivators are not keen for any of them.

66. *Wheat 224.*—This was not tried, but seed supplied last year was grown by some cultivators. It is reported to yield 40 lbs. more per acre and grain quality is considered superior. It is liked by the farmers, but watch will be kept on it to see if its reddish tinge is considered a drawback as in Bhal tract.

67. Groundnut as a rotation crop is reported to increase the yield of cotton by 30 to 40 per cent. So trials of Magadi type late variety for Goradu soils and Spanish Peanut early variety for Black soils were taken. Both yielded about 530 lbs. of nuts per acre. The yield of cotton on these plots requires to be noted.

68. *Demonstrations.*—Some 15 local demonstrations showing wilt resistance of B.D. 8, trials of Jowar Nos. 12 and 8, ploughing in of Sann as green manure, sulphur dusting on Mangoes against hoppers and working of Olpad Wheat Thresher, were held and attended by about 300 people.

69. *Manures and manuring.*—Sann seed for green manuring is being spread. This year 34,400 lbs. of Sann seed was distributed. Castor cake

in powder form is being introduced for manuring cotton and about 74,000 lbs. of this was supplied. 1,172 lbs. of sulphate of ammonia was supplied for garden crops like Onion.

70. *Control of Jowar smut.*—During the year 1,510 Sulphur packets were distributed with the help of the Mamlatdars of Amod and Vagra and Kamgars of Cotton Boll-worm Clean-up Scheme.

71. *Supply of seeds and fruit plants.*—About 530 fruit plants (Mangoes and Lemons), new types of Sugarcane, Groundnut, Jowar, Tobacco and Castor seeds were supplied.

72. *Cotton Boll-worm Clean-up Scheme.*—As reported in paragraph 95 of last year's report, the Scheme last year was not wholly carried out, hence to ensure its complete success, an additional staff of one Graduate Assistant for five months and nine supervisors and 120 Kamgars for four months were engaged in the busy season during the year.

It was necessary that every cultivator should have sufficient plant pullers in order to finish the cleaning in time. During the year about 3,000 more pullers were sold at cost price Re. 1-2-0 each. Plant puller competitions were held at 15 centres and to the first four successful cultivators the prizes were given. This demonstrated that a person can uproot and collect cotton stalks from 8 gunthas in an hour.

Special efforts were made to eradicate alternate food plants like green Abutilon (Kaski) weeds and stray plants of cotton found in waste lands and hedges. Small area of Bhendi crop was also removed.

Prizes and certificates were distributed to about 200 volunteers who helped in the last clean-up season by Mr. U. M. Mirchandani, the Collector of Broach, the President of the big meeting specially held where the nature of work to be done during 1933 campaign was also explained.

The record showing the area under cotton for each survey number in each village was prepared as soon as the temporary staff of Kamgars and Supervisors was appointed. This record was useful in checking the progress of work from day to day.

Prizes were announced for villages that would complete the work before the prescribed date, so that most of the area may be cleaned by the farmers themselves in time. This created enthusiasm and healthy competition among the villages.

The progress was considerably speeded up due to the above measures during the season with the following results. The area under the campaign was of 125 villages.

	1932.	1933.	Remarks.
*1. Number of villages in which Clean-up work was over by 5th of May	None.	14	In 1933, 93 per cent. of the area was cleaned up and 7 per cent. of the area remained due to idleness of the farmers and labour scarcity on the 15th of May.
2. Area cleaned up by 5th of May.	23,000 acres.	53,000 acres.	
3. Number of villages in which Clean-up work was over by 15th of May .. ..	....	63	
4. Area cleaned up by 15th of May	45,000 acres.	75,000 acres.	

* Earned 1st Class Prizes.

Individuals were rewarded by personal prizes and certificates. After 15th May, nearly 7 per cent. of the area had to be cleaned up by direct action, so that the people who did the work early may not suffer for the faults of the few backward neighbours. The clean-up was over by the 23rd of May in all the villages of the Scheme.

In order to judge the results of this campaign of last year, the records of population of Boll-worm larvæ were kept this year in 15 different centres inside and outside the clean-up area. The general incidence of the pest was at a very low level in five centres of the clean-up zone even though the clean-up was not thorough last year. Also 50 plants were grown free from Boll-worm by night caging in each of the different centres. The difference in yield between caged and non-caged plants varied from 23 to 57 per cent. in seven centres. In the eighth centre there was no difference.

Conclusions.—The results show what can be achieved by the intensive mass propaganda by the Agricultural Department with the full co-operation of the Revenue Department. Our special thanks are due to Mr. Mirchandani, the Collector of Broach, who was ever ready to help the work by personal visits and through Mamlatdars and other Revenue Staff.

It may be noted that the up-rooting of the Cotton stalks has been largely adopted in the tract and this system speeds up the farm work by about 25 per cent. which means a saving of half a day's work per acre which amounts to 6 to 8 annas per acre. In view of these advantages the Scheme for wider seasonal propaganda for the general improvement of cultivation, has been put up for clean-up work in the whole of Broach and Surat districts.

Surat District.

73. *Seed multiplication and distribution.*—1027 A.L.F. Seed in Surat tract.—13,627 acres were grown under the type in four groups. 5,752 bhars of Kapas were ginned at four centres, giving 2,258 khandies of lint.

The seed distributed out of the group areas and the farm pedigree seed was as under :—

- (1) (A) 22,659 Farm pedigree seed, in selected villages of each group, the resultant seed of these to be distributed to the remaining villages in each group next year.
- (B) 613,748 lbs. to the remaining villages in each group and other villages through 19 dépôts.
- (2) 285,286 lbs. to the Co-operative Sale Societies in Olpad Taluka.
- (3) 1,660,980 lbs. to the adjacent Native States.

2,582,673 lbs. total.

It is interesting to note that the Co-operative Sale Societies purchased 1027 A.L.F. seed for the first time for distribution to their members, as they found very great difficulty in selling their cotton which was mostly Local and was inferior

74. *District trials of 1027 A.L.F. versus Selection 1A.*—These are reported under Cotton Policy in South Gujarat.

75. *Trial of Broach Deshi 8 for wilt resistance.*—A thorough trial of B.D. 8 and 1027 A.L.F. was taken at Shera (Ankleshwar Taluka) the results were decidedly in favour of B.D. 8.

76. *Budh Perio 53 Jowar.*—6,567 lbs. of pure seed was distributed in South Surat District.

77. *Rice—Kolambo 79.*—It has spread in the District but is not superior to local Kada. A trial with K 184 and K 401 was taken with Kada. Both have yielded better; further trials are necessary to prove their superiority.

78. *Wheat.*—Bansi 224 and Pusa 4 were tried with Local in Chikhli Taluka as dry crop; both yielded better than the Local. Further trials are necessary.

79. *Sugarcane.*—CO. 213 was tried on about $3\frac{1}{2}$ acres at Pardi, the outturn of Gul is not encouraging due to defect in the crusher; however as it requires less waterings and is also one of the best canes for Sugar contents, it is superior to any local type.

Two multiple furnaces were constructed by the Department and it indicated a saving of 20 to 40 per cent. of the fuel per boiling. The help of the Department was also given in making Sugar by open Pan system. The venture was successful and it is reported that Sugar-making was profitable so long as Gul rate was below Rs. 2 per 37 lbs.

80. *Distribution of manures.*—Four tons of bone meal for Mango trees and 43,400 lbs. of denatured salt for all sorts of fruit trees were distributed.

81. *Distribution of seeds and implements—*

Name of the crop.		Number or quantity.	Remarks.
Paddy	..	970 lbs.	
Castor	..	770 lbs.	
Sugarcane CO. 213	..	22,000 sets.	} For trial in Surat tract.
Sugarcane E.K. 28	..	550 sets.	
Sugarcane P.O.J. 2878	..	950 sets.	
Sugarcane S. 48	..	150 sets.	
Suran	..	48,562 lbs.	} Supplied outside.
Ginger	..	4,489 lbs.	
Turmeric	..	126 lbs.	
Yams	..	3,056 lbs.	
Chikoo plants	...	210	
Mangoes	..	100	
Kagdi Lemon	..	35	
Sugar Centrifugal Machine.		1	For Surat.

82. *Demonstration.*—Sulphur dusting on Mango trees was demonstrated at several places in Bulsar and Chikhli talukas. Pardi Taluka was looked after by the Overseer of the Taluka Development Association. In all 40 dusting machines were working. 2,348 trees were treated by

the Department. As a result of this propaganda 25 cwts. of Sulphur dust (besides 2 tons supplied by the Agents of the Firm) and two more machines were ordered by the cultivators. Vigorous propaganda for the removal of a parasite *Loranthus* on Mango trees was carried out and as a result 20,000 trees have been cleared of this parasite.

V—Organisation.

83. *Divisional Board.*—In all 3 meetings were held, two under the Chairmanship of the Deputy Director of Agriculture and one under the Assistant Registrar, Co-operative Societies, Northern Division. No meeting of the Divisional Cotton Committee was held.

84. *Taluka Development Associations.*—There is no change in what is stated last year.

Old Agricultural Associations.—The funds of the Bulsar-Pardi Joint Association were divided between two talukas and the funds for Pardi were handed over to the Pardi Taluka Development Association. The share of Bulsar is lying with the Deputy Director of Agriculture, Gujarat, Surat, and may be handed over to the Association when revived.

The Broach Agricultural Association has now engaged a Kamgar for propaganda work under the guidance of the District Agricultural Overseer, Broach. It is also publishing a quarterly paper under the honorary editorship of Mr. A. K. Vashi, B.Ag.

85. *Agricultural Co-operation.*—The Agricultural staff is helping the Co-operative Societies in all agricultural matters.

86. *Cotton Policy in South Gujarat.*—During the year the trials were continued as reported in paragraph 78 (b) of last year's report. The trials this year were in five replications and the area of each replicate was generally 8 gunthas and the sowing was done according to the general practice of the farmer.

The detailed results are given in the Experimental Report. The conclusions are as under :—

(A) Yield of Seed-cotton.

Taking the whole Surat tract, in 17 trials out of 19, IA Long Boll yields more than 1027 A.L.F. ; in one trial the yield is about equal and in only one IA Long Boll yields less than 1027 A.L.F., by 2·75 per cent. On the whole IA Long Boll yields more seed cotton than 1027 A.L.F. by 10·5 per cent.

However if the results are statistically examined to find out the significance of the increase in yield by the Students' method, we find that the results are significant in nine trials out of 19 in favour of IA Long Boll. It is further observed that the results are significant wherever the increase in yield is more than 11 per cent.

(B) Ginning Percentage.

1. In the North Tapti IA Long Boll gins on an average 39·4 per cent. against 34·9 per cent. of 1027 A.L.F., the average difference being 4·5 per cent.

2. In the South Tapti IA Long Boll gins on an average 38·5 per cent. against 34·6 per cent. of 1027 A.L.F., the average difference being 3·9 per cent.

From this it is clear that IA Long Boll has a special advantage of higher ginning by 3·9 per cent. which gives 10 per cent. more lint.

(C) *Comparative spinning tests by Mills of Cottons grown in the District trial plots—1931-32.*

It may be observed that the Mill tests are the real tests on which the Cotton is ultimately paid. For this purpose representative samples of about 100 lbs. were taken in duplicate from the mixed product of each type of cotton grown on the North as well as on the South of the Tapti for tests in two Ahmedabad Mills. A sample of 10 lbs. each was also sent to Matunga Laboratory for comparison. These results are tabulated below :—

				Percentage of losses.	Actual counts.	Lea Strength in lbs.
<i>Mixed samples of North Tapti.</i>						
Matunga Laboratory	..	1027 A.L.F.	..	16·6	20·1	73·9
Do.	..	Sel. IAL.B.	..	15·4	19·8	74·5
Asoka Mills	..	1027 A.L.F.	..	17·25	20·48	60·5
Do.	..	Sel. IAL.B.	..	14·25	19·7	67·1
New Standard Mills	..	1027 A.L.F.	..	15·0	20·0	56·0
Do.	..	Sel. IAL.B.	..	15·0	19·8	58·0
<i>Mixed samples of South Tapti.</i>						
Matunga Laboratory	..	1027 A.L.F.	..	15·1	19·2	86·4
Do.	..	Sel. IAL.B.	..	15·4	19·8	74·5
Asoka Mills	..	1027 A.L.F.	..	16·5	19·8	64·4
Do.	..	Sel. IAL.B.	..	15·25	20·1	67·7
New Standard Mills	..	1027 A.L.F.	..	15·2	19·51	68·0
Do.	..	Sel. IAL.B.	..	12·5	22·09	62·0
<i>Cottons grown on Surat Farm on replication plots.</i>						
Matunga Laboratory	..	1027 A.L.F.	..	16·2	21·2	72·9
Do.	..	Sel. IAL.B.	..	15·2	20·5	78·6
Asoka Mills	..	1027 A.L.F.	..	14·0	19·9	69·7
Do.	..	Sel. IAL.B.	..	13·75	19·7	65·0
New Standard Mills	..	1027 A.L.F.	..	14·0	20·2	69·0
Do.	..	Sel. IAL.B.	..	11·0	19·8	74·0
<i>General Cotton on Surat Farm.</i>						
Matunga Laboratory	..	1027 A.L.F.	..	13·0	18·9	99·3
Do.	..	Sel. IAL.B.	..	12·7	19·8	88·0
Spring Mills, Bombay	..	1027 A.L.F.	..	5·5	20·0	72·0
Do.	..	Sel. IAL.B.	..	4·5	19·8	65·0
Matunga Laboratory	..	1027 A.L.F.	..	13·3	19·3	101·5
Do.	..	Sel. IAL.B.	..	12·8	19·4	88·4
Textile Mills, Bombay	..	1027 A.L.F.	..	5·0	20·0	68·0
Do.	..	Sel. IAL.B.	..	6·0	19·8	70·0

Remarks.—Results show that in the North Tapti Selection IA Long Boll has equal or less loss than 1027 A.L.F. in spinning. As regards counts and strength both the types spin about equal.

In South Tapti IA Long Boll also shows less loss in spinning than 1027 A.L.F.

As regards counts and strength IA Long Boll seems to be spinning little better if at all.

If we compare the test of the same samples by the Matunga Laboratory we find that IA Long Boll looses equal or less than 1027 A.L.F., and thus, confirms the results by Mill tests.

However we find that Mills spin about 20's warp from both the types ; whilst the Matunga Laboratory spins 23·5's to 23·9's from IA Long Boll and 25's to 28's from 1027 A.L.F., this difference being of no practical value for Mill spinning as stated above.

Results of spinning tests, 1932-33.

1. A mixed sample of 11 lbs. of lint made up from five replications of each plot for each type of cotton has been taken and sent to Matunga Laboratory, these samples are 19 from each type of cottons.

2. Mixed sample of 100 lbs. has been collected from all the trials on the North of the Tapti as well as the South of the Tapti of both the types for Mill tests and 11 lbs. sample from the same has been sent to the Matunga Laboratory for comparison.

3. The results from the Ahmedabad Mill and the Matunga Laboratory tests for mixed samples are given below :—

Comparative Spinning tests by Mills of Cottons grown in the District trial plots, 1932-33.

				Percentage of losses.	Actual counts.	Lea Strength lbs.
<i>Mixed samples of North Tapti.</i>						
Matunga Laboratory	..	1027 A.L.F.	..	14·9	19·2	98·5
Do.	..	Sel. IAL.B.	..	14·0	19·6	84·9
Bharatkhand Mills	..	1027 A.L.F.	..	9·7	19·23	70·75
Do.	..	Sel. IAL.B.	..	9·7	19·32	70·0
<i>Mixed samples of South Tapti.</i>						
Matunga Laboratory	..	1027 A.L.F.	..	14·5	19·5	94·5
Do.	..	Sel. IAL.B.	..	13·7	20·0	84·9
Bharatkhand Mills	..	1027 A.L.F.	..	7·4	19·41	70·0
Do.	..	Sel. IAL.B.	..	8·4	19·70	74·5

Mill and the Matunga Laboratory tests for mixed samples of North and South Tapti should be quite enough to judge the performance of two types of Cotton ; as the tests of individual plots of 1931-32 do not show any material difference.

Remarks.—The Mill tests show clearly that IA Long Boll is as good as 1027 A.L.F. for spinning purposes.

The Matunga Laboratory tests for mixed samples show that IA Long Boll and 1027 A.L.F. show a difference of 3's both in the North as well as in the South Tapti; while last year the difference in the North Tapti was 1·5's and in the South it was 3's. But this difference disappears in the Mill tests.

87. *Cotton Transport Act.*—The working of this Act has not been very successful as all the Gin-owners do not fully co-operate. Those of Ankleshwar have fully discouraged Goghari cotton, but the Gin-owners of Navsari are still indifferent to the reputation of Navsari cotton or to the lossess of the Farmers. Some control over gins is necessary to remedy the situation.

Apart from this question, it would be advantageous to the Cotton growing industry, if one type of cotton establishes in the whole tract. The results of the critical trials and previous knowledge of the premiums obtained for 1027 A.L.F., indicate that pure IA is superior to ordinary Local by Rs. 7 to Rs. 8 and has also an advantage of 10 per cent. in yield due to higher ginning, viz., 3·9 per cent. over 1027 A.L.F. and it is a better paying type.

1027 A.L.F. fetches only 3·7 per cent. higher price for better quality over Local and 2 per cent. over IA Long Boll, which does not compensate for the higher ginning per cent. of IA Long Boll, thus it appears that it will be to the advantage of the farmers to go in for IA Long Boll.

VI—Agricultural Services:

88. *Supply of Premium Bulls in the Division.*—Six bulls were supplied in the non-breeding zone. Five from Surat Dairy and one from Chharodi (Northcote Cattle Farm, Chharodi).

89. *Pest Control.*—Packets of Arsenic and strychnine were supplied to cultivators for destruction of jackals and rats.

90. *Mechanical help.*—During the year under report the jurisdiction of the Mechanical Assistant was extended to North Central Division. He attended 34 applications out of 35 for advice and help. He erected 3 pumping plants and 39 other works such as site survey, advice for repairs, inspection and drawings etc. were attended to by him. In addition to the above works he attended to machines on the Surat Farm whenever his help was found necessary.

91. *Horticultural work.*—One Non-graduate Assistant trained in Horticulture is stationed at Anand under the Inspector of Agriculture, Kaira, Anand. He visits the newly started fruit gardens from time to time and gives necessary advice to the owners.

The District staff in the Division is occasionally approached by the farmers for advice regarding improvement of lands and introduction of new crops and all such requests have been complied with by the District staff.

VII—Educational work.

92. The District staff continued to inspect and take Annual Examination of Agricultural Bias Classes. They also conducted the Vernacular Final Examination with Agricultural Bias.

VIII—Publicity.

93. The Members of the staff contributed several articles to the Industrial and Agricultural Quarterly published by the Broach District Agricultural and Industrial Association, Broach. Several articles were also supplied to the Editor, *Gujarat Patrika*. Several Leaflets issued by the Department were translated into Gujarati for publication and distribution in Gujarat Division.

IX—Miscellaneous.

94. The staff on the whole worked well.

B. S. PATEL,
Deputy Director of Agriculture,
Gujarat, Surat.

Surat, 4th September 1933.

**Programme of work to be done under the Deputy Director of
Agriculture, Gujarat, Surat, for the year 1933-34.**

I. Research.

Surat.

(a) COTTON.

1. Evolving a variety that will gin higher than 1027 A.L.F. and will spin the same by studying various crosses on hand.
2. Attempting to improve spinning of 1027 A.L.F. by selection of crosses.
3. Further study of the selections made from the collections of samples of local seed grown in 1932-33.
4. Production of selfed seed of cotton.

(b) JOWARS.

1. Maintaining pure strains.
2. Testing Bardoli jowar for yield.
3. Production of selfed seed of Budh Perio 53.

Broach.

COTTON.

1. Maintenance of ten old types.
2. Study of crosses for combining wilt resistance and superior fibre qualities of Broach Deshi 8 with high ginning character of other cottons.
3. Purification and testing of two new promising selections Nos. 10 and 12.
4. Study of 100 fresh selections made from Local cotton for wilt resistance under field conditions and for economic characters.
5. Study of seasonal variations in wilt-incidence.
6. Further testing of B.D. 8 and other pure strains in heavily inoculated pots under standard conditions of disease development for getting a homozygous wilt resistant race of cotton.

JOWAR AND WHEAT.

1. (a) Maintenance of pure types of jowar.
- (b) New selections will be studied for their purity and other economic characters.
- (c) Yield trial of Nos. 8 and 2A.
- (d) Study the Natural cross-pollination in Rabi Jowars.
2. *Wheat*.—Selections made will be studied in details.
3. *Manurial Experiment*.—(a) Cotton :—Manurial experiment will be continued on cotton.

(b) Study of Sann Green manuring before the sowing of Rabi Jowar.

4. *Groundnut*.—Spanish Peanut will be grown to see how it fares under Broach conditions with a view to introduce it in cotton rotation.

TOBACCO WORK AT NADIAD.

1. Study of crosses for cigarette purposes.
2. Study of crosses for local market.
3. Selections of Keliu type for local market.
4. Yield and quality trials of various suitable strains for cigarette and local market.
5. Growing of some foreign tobacco of cigarette type.
6. Study in methods of curing tobacco for cigarette.
7. Improving cultivation of Tobacco for cigarette purposes.

BAJRI.

1. Selections work to obtain a strain that will suit for grain as well as fodder will continue.

CASTOR.

1. Replication yield tests of 4 promising strains with locals.
2. Purifying these strains.
3. Selections work from Local samples.

Viramgam.

1. Maintaining pure *strains*.
2. Multiplication of seeds of Wagad 8.
3. Yield trials of 5 strains from the 1027 A.L.F. and Wagad 8 cross in comparison with local and Wagad 8.

JOWAR.

Purifying selections made from 2 local jowars.

Surat Farm.—The seed multiplication work for cotton and Jowar for Surat Tract will continue, manurial, ridge, cultural spacing and Dhaincha green-manuring experiments in cotton mentioned last year will continue so also jowar thinning experiment. Besides trial of late sowing of cotton, jowar etc. after Dhaincha green manuring will be made.

Surat Dairy.—Dairy herd of best Kakrenj milch cows will be maintained and bulls will be given out as premium bulls as in the past.

Dohad Farm.—The Farm is devoting itself to the work of producing pure seed of Spanish Peanut, Maize, Pusa 4 Wheat and other seeds for distribution in the tract where Bhils never store their seeds.

Besides the Farm is holding demonstration classes to introduce Drill-sowing and interculturing for Maize and Wheat crops of the Tract.

II. Propaganda.

Surat.

1. Control of seed multiplication of 1027 A.L.F. at four group centres and distribution of the resulting seed in the tract.
2. Checking the spread of Goghari in Surat Tract by keeping vigilant watch over the movement of cotton seed from across the Narbada and by persuading the grower to go in for the 1027 A.L.F.
3. In garden areas the propaganda against mango-hoppers by sulphur dusting and cutting of loranthus will be followed very intensively.
4. Spread of Co. 213 Sugarcane the best variety so far known in Surat Tract and trial of other varieties.
5. Advocating proper manuring of fruit trees, rice and sugarcane.
6. Trial of new strains of rice suitable for the tract.
7. Spread of Clean-up measures for controlling Cotton Boll-worm.

Broach.

1. Advocating San green manuring in fallow lands.
 2. Trial of small varieties of groundnut in lighter soils as a rotation crop.
 3. Propaganda against Jowar smut by distribution of sulphur packets.
 4. Completing the experiment of control of Boll-worm by intensive work in Western parts of the District.
- Spread of Clean-up measures particularly the use of Plant Pullers in other cotton areas.

Kaira.

1. Seed Distribution of Tobacco Nos. 6 and 28.
2. Trials of wider sowing of Bajri, Kodra and Cotton.
3. Manurial trials of Bajri, Bavto and Kodra.
4. Demonstration of dusting sulphur on Jiru against Mildew.
5. Horticultural advice to growers regarding the improvement of the methods of growing fruit trees.
6. Introduction of new fruit plants such as Mosambi, Figs, Chikoo etc.
7. Holding Horticultural Class.

Panch Mahals.

1. Spread of Co. 213 and better cultivation on wider ridges and manuring of sugarcane.
2. Introduction of Punjab Persian Wheels, Cane Crushers, better type of furnace and gul pans and teaching people to make better gul.

3. Advocating the use of sulphate of ammonia for rice seedlings and rice crop.

4. Introduction of Magadi type of Big Japan Groundnut in the suitable areas.

5. Spread of pure Spanish peanut, Pusa 4, Farm Maize seed etc. in Eastern Mahals.

6. Use of Drill and wider sowing of Maize and Wheat in Eastern Tract.

7. Control of smut by intensive distribution of sulphur packets.

Ahmedabad.

1. Trials of Wagad 8 versus Local.

2. Multiplication of seed of Wagad 8 in Viramgam Taluka.

3. Trials of wider sowing of cotton for reducing cost of cultivation and for increasing yield.

4. Trials of wider sowing of wheat.

5. Trial of new suitable strains of wheat, such as Nos. 224, 809 and of Rice 42 and 184.

6. Advocating application of sulphate of ammonia to rice seedlings and rice crop.

7. Trial of manures for fruit trees, viz. Bone-meal and denatured salt etc., etc.

8. Introduction of Basarai plantain, Mango grafts, seedless Guavas, Chikoo, Mosambi, Budded Lemon and Bor Budding.

9. Intensive propaganda to control smut in Jowar by sulphur treatment.

10. Trial of Norag and other Threshers for wheat threshing.

11. Introduction of light plough for preliminary rice cultivation in Ahmedabad tract and supply of spare parts.

In addition all the District Agricultural Overseers have to take trials of improved items of new seeds, manures, cultural methods, use of harrows, ploughs and convex blade for Broach harrows and inspect Bias classes and examine them and guide Taluka Development Associations and advise on agricultural matters.

B. S. PATEL,

Deputy Director of Agriculture,

Surat, 30th August 1933.

Gujarat, Surat.

APPENDIX G.

SUMMARY OF WORK DONE UNDER THE PROFESSOR OF
AGRICULTURE, POONA, FOR THE YEAR 1932-33.

Charge.—Mr. V. G. Gokhale, continued to be in charge of the office of the Professor of Agriculture, throughout the year.

2. *Lines of work.*—These remained as before as indicated by the headings under which this summary is prepared.

3. *Staff.*—This remained as in 1931-32, viz. at 8 assistants, two in the Provincial cadre and 6 in the upper subordinate cadre.

A. Teaching.

4. At the degree examination in the subject of agriculture 88.5, as against 70 per cent. of last year, have passed. The introduction of compulsory practical field exercises in the second and final years' work added materially to improve the efficiency of the students' work. Nine students took Intensive study of crops, the percentage of passing being 78 as against 71 of last year. In the Intermediate Agriculture 95 per cent. candidates have passed as against 92 of last year in the subject of Agriculture.

Five post-graduate students registered themselves for M.Ag. work under the guidance of Professor V. G. Gokhale, who has been recognised for the purpose by the Bombay University. Two of them however discontinued their work during the year.

One student took a month's special training in Dairying during the year.

The University Inspection Committee visited the Agricultural College Farm and the Agricultural College Dairy and expressed great satisfaction both as regards the running of the two farms as also the research items in hand.

5. *The College Farm.*—This farm is maintained mainly for the instruction in practical agriculture. It also affords facilities for research of the other sections of the College.

The total rainfall from 1st May 1932 to 30th April 1933 was 29.86 inches, i.e. about 2 inches over the average. The regular monsoon started in the 1st week of July enabling the sowing of kharif crops by the third week of that month. The nature of rainfall in August, September and October caused almost an over-wet condition of the soil, thus checking very much the growth of many *kharif* crops. The rain in October, November and some even in December, however was helpful to the *Rabi* crops. The month of December was about 5 degrees cooler than in the last year.

The prominent crop pests and diseases were the aphids on Cabbage, mosaic on Double beans, leaf-shred on *jowar* and army worms on *jowar*. No suitable remedies have yet been known against these.

The effects of the above season are indicated by the following statement :—

Crop.	1932-33.	1931-32.	Best yield in the History of the Farm.	
			Yield.	Year.
<i>Bajri</i>	1,000	1,764	1,764	1931-32
Late groundnut (Big Japan) ..	1,421	1,650	2,768	1913-14
Early groundnut (Spanish peanut) ..	965	1,505	2,082	1912-13
Cotton (N. R.)	251	696	1,900	1919-20
<i>Shalu jowar</i>	2,132	1,692	2,578	1928-29

B. Research and Investigation.

6. *Accurate preliminary testing of the value of certain nitrogenous fertilisers.*—This is the fifth year of the investigation of 20 lbs. of nitrogen in the case of *bajri*, *shalu jowar* and groundnut crops and 20 and 40 of nitrogen in the case of the onion crop. All the fertilisers of the previous year were tried this year.

The results show significant increases in the case of (1) *bajri* with all the fertilisers varying from 28·4 to 43·4 per cent. on an average, (2) groundnut with all the fertilisers varying from 8·6 to 18·3 per cent. and (3) onions with all the fertilisers varying from 15·6 to 24·5 per cent. for 20 lbs. nitrogen dose and from 35·5 to 47·3 for 40 lbs. These increases are also economical in case of all the fertilisers with onions and sulphate of ammonia for *bajri* and groundnut. *Shalu jowar* has not favourably responded to any of the treatments.

7. *Effect of different methods of applying sulphate of ammonia on shalu jowar crop.*—Broadcasting just before sowing and drilling a fortnight before sowing have respectively given significant increases of 20 and 14 per cent. over check in which no fertiliser was at all applied while drilling fertiliser between the lines of seeds at sowing, drilling the fertiliser by *mogan* in the line of seeds at the time of sowing and drilling the fertiliser a fortnight after sowing are not found to be significantly better.

8. *The position of organic matter in the application of artificial fertiliser.*—The results, with wheat, which was the crop under experiment this year, though not statistically significant exhibit a tendency that the association humus with sulphate of ammonia has no advantage over the total of the two tested differently.

9. *Whether gappiness was a justification for using an automatic seed-drill.*—Sowing with a country drill and dibbling at equal distances an equal and two-thirds quantity of seed by hand compared in the case of *bajri* and *jowar* (winter), did not show that gapping caused any loss in yield.

10. *Vegetable work*.—The addition of sulphate of ammonia gave statistically significant increases over no concentrates in the case of *suran* but none in the case of ginger. The results with both these crops for the last three years being in consonance with each other, these investigations will be dropped.

The comparison of mother sets with finger sets of turmeric showed no significant difference between each other. The comparison of entire sets with cut sets of *suran* showed a significant advantage in favour of the former.

A beginning was made in business management so as to get the best return from a garden holding of vegetable growing this year with a block of 8½ acres. There were in all 20 crops grown. The actual expenditure, including rent of land at Rs. 20 per acre and interest on capital at 6 per cent. came to Rs. 2,708 and the returns amounted to Rs. 3,846, both these closely agreeing with the estimate.

11. *Economics of dry farming under conditions round Poona*.—This study is in progress for the last four years. During the year the field work engaged 4 members of the family for 321 days at 10–11 hours per day. The bullocks worked for 208 days in all. The family got a labour income of Rs. 192 and the whole family expense was Rs. 728 for 5 members.

12. *Storage of dry jowar fodder for 3 years* did not impair its quality.

13. *Position of leguminous crops in rotation*.—The fourth year results show that *bajri* after *kulthi* yielded 25 per cent. more than *bajri* after *bajri* but economically *bajri* after *bajri* yet is the more paying rotation.

14. *Influence of different kinds of tillage*.—Turn-wrest ploughing to a depth of 6" gave, with *kharif jowar*, 25 per cent. more yield as against blade harrowing to a depth of 2 inches and this benefit is nearly equal to that of five cartloads of farm yard manure. The effects on cotton which was a very poor crop are not different.

15. *Sowing groundnut on ridges*.—Showed that though the ridge sown plants individually gave nearly double the yield of flat sown plants, the per acre yield was double with the latter which had six times the number of plants in the ridge method.

16. *Developing higher milk yield in cows and buffaloes along with early maturity and regular calving*.—In Sindhi cows the results of in-breeding of the King Arthur line have been very unsatisfactory. The out-crossing with *Tulip* and *Kanir* bulls have not yet shown any conclusive advantage.

17. *Requirements of concentrates of Dairy animals under Deccan Conditions*.—In a comparison between safflower and groundnut cakes, the latter gave 5 per cent. more milk with buffaloes and 3.3 per cent. more milk with cows, besides being 14 per cent. cheaper than the other cake.

18. *Regulation of bull services.*—With a view to investigate the possibility of obtaining milk supply at desired times an experiment in postponing the services of buffaloes beyond their first heat, has been undertaken since June 1932. It has been found that there is no certainty that animals would come into heat subsequently if their service at the first heat after calving is missed.

Available data regarding calving of buffaloes in various months for the last ten years are under examination with regard to factors that made different animals calve in different months.

C. Commercial Working of the College Dairy.

19. The number of 200 animals and composition of the herd remained practically the same as last year. The health of the animals was generally satisfactory except for an attack of foot and mouth disease in the Manjri young stock during the month of November which subsided after 3 weeks.

20. The average yields of 3,602·8 lbs. per cow and that of 3,781·0 per buffalo show decreases of 122 lbs. and 326 lbs. respectively over that of the last year and are due to normal fluctuations and not to any general reduction.

21. The cost of production and disposal of 100 lbs. of milk works out at rupees 16·61 as against rupees 17·85 of last year due mainly to a reduction of Rs. 0·9 on maintenance of stock owing to cheapening of concentrates and of about Rs. 0·4 on management charges consequent on the retirement of persons drawing higher salaries than those of the new recruits on the starting pay.

The realisations of 15·56 rupees per 100 lbs. is an increase of Rs. 0·7 over that of the last year. This is due to the increase in the quantity which could be sold at the cheapened rates of 6 lbs. to the permanent customers and consequent reduction of surplus milk to be separated and therefore bringing much less value.

22. The total area under fodder crops and the outturn per acre remained the same as last year, the latter averaging about 18,000 lbs. green weight per acre. The cost of producing 100 lbs. of green fodder worked out at annas 7·24 as against 8·05 for the previous year. This is due to less cost of manure, irrigation charges and supervision due to replacement of one assistant at Manjri by a new recruit at the starting pay, and to a more favourable rainfall.

23. The area of grazing furnished forage equivalent to a full requirement of roughage for 25 adult animals for 120 days as against 92 days in the previous year, due to more rainfall over a longer period this year.

24. *Visitors.*—Sir Govindrao Pradhan, the then Finance member of the Bombay Government visited the Agricultural College Dairy on 6th July 1932 when he discussed the possibility of further improving the commercial aspect of that institution.

D. Aid and Assistance to the Public.

25. In all over 685 enquiries and demands for implements, seeds manures, dairy management, crop cultivation, etc., were replied. The Agricultural College Dairy afforded the service of 9 Sindhi cow-bulls and 27 Surti buffalo-bulls to the public.

26. *Help to other sections of the College.*—Help in the form of implements, labour, seeds, land and advice on agricultural matters was rendered to the various sections at the College, the Agricultural Engineer to Government and the Central Poultry Breeding Farm to the extent possible whenever asked for.

27. *Demonstrations and Shows.*—The Agricultural College Dairy put up 3 demonstrations, 2 at Poona and 1 at Betegaon, in connection with the production of clean milk and milk products.

28. *Publications.*—Mr. C. N. Dave published one article on the observations on the regularity of breeding of Hariana and Tharparkar cows in the "Agriculture and Live-stock" of January 1933.

V. G. GOKHALE,
Professor of Agriculture.

**Programme of work under the Professor of Agriculture,
Agricultural College, Poona, for the year 1933-34.**

I. TEACHING.

Teaching is the primary function of the staff of the Professor of Agriculture's section and this work will continue as in the last year. This will occupy about 60 per cent. of the time of the staff.

II. ADMINISTRATION.

In connection with the teaching, two large institutions, viz. the College Farm and the College Dairy, have to be run. The work under this section has increased steadily owing to greater and greater details in account and audit matters.

The heavy retrenchment of three graduate assistants and three non-graduate assistants from 1st March 1932, has increased the burden on the remaining staff.

III. INVESTIGATIONS AND RESEARCH.

Only about 10 per cent. of the time of the staff is thus available for this work. Therefore only such pieces of investigation and research can be tackled as would be possible in such a broken up time. Subject to this limitation the following shows the programme under this head :—

A. Omissions from the Programme for the last year 1932-33.

Subject.	Investigator Professor of Agriculture in collabora- tion with	Reasons.
1. Whether Gappiness is a justifi- cation for using an improved seed drill.	Mr. K. S. Kulkarny, Assistant Professor of Agriculture.	As per decision of the Crop Research Com- mittee of 1933.
2. Collectoin of up-to-date infor- mation on Cotton.	....	For want of Staff.
3. Perfecting the Technique of 'ultivation to get the maxi- mum yields of the best quality of Produce.	Mr. A. R. Neginhal, Lecturer in Agriculture and Superintendent, Agricultural College Farm.	Concluded.
(a) Manures.—Manurial re- quirements for Suran and ginger.	....	Do.
(b) Seeds and Seedlings.— mother sets vs. fingure sets of turmeric.	....	....

B. Continuation from the programme of 1932-33.

Subject.	Investigator Professor of Agriculture in collaboration with	Reasons.
1. Accurate preliminary testing of artificial fertilisers.	Mr. P. M. Gaiwala ..	Carried out for further testing.
2. The most profitable scheme of vegetable growing.	Mr. A. R. Neginhal, Lecturer in Agriculture and Superintendent, Agricultural College Farm, Poona.	Do.
3. Cut <i>vs.</i> Whole sets of Suran ..	Do. ..	Do.
4. Study of Dry Farming as a business under Poona conditions.	Mr. R. M. Chaudhari, Lecturer in Agriculture.	To collect data over a sufficiently long period.
5. Position of a Leguminous crop in a rotation.	Mr. R. S. Kittur, Demonstrator in Agriculture.	Do.
6. The influence of different kinds of preparatory tillage on Cotton and Jowar.	Do. ..	Do.
7. Development of Higer milk yield in cows and buffaloes by breeding, along with early maturity and regular calving.	The Assistant Professor of Animal Husbandry.	Not yet finished.
8. Requirement of Concentrated foods for Dairy cattle in the Deccan.	Mr. D. B. Kolhe, Lecturer in Dairying and Mr. C. N. Dave, Demonstrator in Dairying.	Other concentrates to be tried.

C. Addition to the Programme of 1932-33.

Perfecting the Technique of Cultivation to get the maximum yields of the best of produce. (a) <i>Manures</i> .—Manual requirements of Sweet Potatoes and Brinjals.	Mr. A. R. Neginhal, Lecturer in Agriculture and Superintendent in Agricultural College Farm, Poona.	As per directions of the Crop Research Committee of 1933.
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V. G. GOKHALE,
Professor of Agriculture.

APPENDIX H.

SUMMARY OF WORK DONE UNDER THE AGRICULTURAL CHEMIST TO
GOVERNMENT OF BOMBAY, POONA, FOR THE YEAR 1932-33.

During the year under report I was in charge of the office and the Laboratory of the Agricultural Chemist to Government, Bombay Presidency, throughout the year. The water finder section was retrenched in 1931-32 and therefore there was no work done under that heading.

As usual the work under the Agricultural Chemist falls into the following categories :—

1. Analytical work (a) for the public, (b) for the Agricultural Department itself and (c) for other Government Departments or Institutions.
2. Research work and publications.
3. Teaching work—at the College of Agriculture, Poona.
4. General—Staff.

1. *Analytical work.*

The analytical work includes analysis of samples and advice based on the results of analysis. During the year under report the number of samples received for analysis was 648. Out of these, 604 were from the Agricultural and other Government Departments while 44 samples were received from private bodies and persons.

The Government samples consisted of 157 soils, 110 waters, 185 feeding stuffs, 94 manures, 13 oil seeds and 45 miscellaneous. Many of the Government samples are analysed in connection with the various problems under investigation by the different sections of the Agricultural Department. Under waters were included the run-off samples from the Soil Physicist who is trying to find out what quantities of plant food constituents are washed away from the soils by the rain water running down the slopes of different characters. The Livestock Expert is investigating the food values of herbages and their mineral contents. As many as 55 samples were analysed for him.

The number of samples received from private individuals or concerns is small because since last year fees are charged for the analysis done. Out of the 44 samples received 9 were soils, 9 waters, 12 manures, 4 oil seeds, 5 feeding stuffs and 5 miscellaneous.

2. *Research work and publications.*

Investigations of small problems referred to the Agricultural Chemist are included under analytical work and it is only the larger and definite problems that are included under research :—

1. The work on the movement of manures which was nearly completed in the previous year was put together. The results have been put in the form of a paper and sent for publication.

2. The work done on the decomposition of oil-cakes when put into the soil as manures was completed in the year under report and a paper based on the results has been sent for publication.

3. A study of the manurial constituents assimilated by crops has been completed as far as some of the important crops are concerned. The results are not yet ready for a paper.

4. The study of the Digestibility of rice starch which was started some years ago was completed. The result will be soon prepared for publication.

5. The study of the chemical changes during the formation of rice seed and also during the germination of rice was taken up. The study will be soon completed.

6. Compost making from farm residues which was carried on under the direct supervision of the Assistant Professor of Agriculture, has been completed. The results have been put together. The report is being typed.

7. A study of the presence of copper in cattle feeds is taken up and will be continued if other work allows time.

8. A preliminary study of the effects of sodium nitrate on the earthworms in soils has been started. Nothing worth mentioning has yet come out. This will be continued.

Much of the investigation work had to be cut down as two assistants from the chemical section have been retrenched.

Publications.

The following papers on important research works were published during 1932-33 :—

1. A study of the oil from the Niger seed, by D. L. Sahasrabuddhe and N. P. Kale. Jour. University of Bombay, Vol. I, Part II, September 1932.

2. Nitrogen Recuperation in the soils of the Bombay Presidency, Part III, by D. L. Sahasrabuddhe and N. V. Kanitkar. Indian Jour. Agricultural Science, Vol. V, Part V, October 1932.

3. A Biochemical study of the formation of oil in Niger seed, by D. L. Sahasrabuddhe and N. P. Kale. Indian Jour. of Agricultural Science, Vol. III, Part I, February 1933.

4. Disintegration of Bones, by D. L. Sahasrabuddhe. Agriculture and Livestock in India, Vol. III, Part III, May 1933.

3. Teaching.

I am in charge of the teaching of Chemistry and Geology to all the classes of the Poona Agricultural College. As indicated previously there is too much work for the Chemistry Section. Last year the post of the Demonstrator in Chemistry was retrenched this made the whole situation

woise. The teaching of practical Chemistry suffered. It is necessary to take some steps to improve this condition. The earliest possible opportunity should be taken to restore the post of the Demonstrator. During the year under report I had two Post-graduate students working for the M.Ag. degree of the Bombay University. One of these has now submitted his thesis and the other will send his when ready.

4. Staff.

Under this heading I have practically to repeat what I said last year.

The retrenchment axe has fallen very heavily on the Chemistry Section. All the four assistants under the water finder work have been cut off. They used to render help in analysing samples when they were not out of Poona for duty. That help is now gone for ever. One of the Junior assistants is also retrenched. This makes it very difficult to cope with the analytical work. I have already referred to the cut of one assistant under teaching. All this wholesale cut makes it extremely difficult to carry on routine work, much less take up any research work. We always had two or three good problems on hand under investigation and I felt proud that with hard work we were able to carry on research along with the heavy routine duties. With the changed circumstances now, I doubt very much whether we shall be able to keep up the former standard.

In closing this report I must say that all my assistants rendered loyal co-operation in carrying out the work of my section.

D. L. SAHASRABUDDHE,

Agricultural Chemist to Government,
Bombay Presidency, Poona.

Poona, 10th July 1933.

Programme of work under the Agricultural Chemist to Government for 1933-34.

Due to retrenchment very little Research work can be taken. In addition to the analytical work the following problems will be studied :—

1. Recuperation of Nitrogen by soils under irrigation conditions.
2. Effect of Sodium Nitrate and other substances on earth worms in garden soils.
3. A study to find out the presence of copper in cattle feeds.

D. L. SAHASRABUDDHE,

Agricultural Chemist to Government,
Bombay Presidency, Poona.

Poona, 10th July 1933.

APPENDIX I.

SUMMARY OF WORK DONE UNDER THE ECONOMIC BOTANIST TO
GOVERNMENT OF BOMBAY, POONA, FOR THE YEAR 1932-33.

Mr. L. S. S. Kumar officiated as Economic Botanist for the whole year under report except for one day when Dr. Burns resumed charge of the section on 29th October 1932. Subsequently Dr. Burns was appointed as officiating Director of Agriculture, Bombay Presidency, Poona, and Mr. Kumar resumed charge of his duties as the officiating Economic Botanist.

In addition to his officiating duties as Economic Botanist, Mr. Kumar held charge of the post of Assistant Professor of Botany up to 28th July 1932, when Mr. V. M. Chavan, Rice Breeder, Mugud Farm, was appointed to act as Assistant Professor of Botany.

Mr. S. R. Godbole and Mr. W. V. Joshi continued their work as Assistant Economic Botanist and Demonstrator in Botany respectively.

Bajri Research.

In accordance with the decision arrived at the Crop Research Committee Meeting held in April 1932, an experiment to determine the advantages or otherwise of growing a mixture of several selected strains of *Bajri* over the local practice of growing individual strains was carried out on the Poona Agricultural College Farm. For this experiment the following six types, viz. Poona selections 54, 37, 59; a mixture in equal proportion of these three; hybrid 54 $\times$ 59, and local were used. The replication was according to Latin Square method.

From a statistical interpretation of the result of the latin square experiment it has been found that there is no significant difference between the types compared with regard to grain yield. Mixture and hybrid proved slightly superior to local while the three selected strains proved better than either the mixture or hybrid.

The experiment is in its first year of trial and is to be continued for another two years before final conclusions will be drawn.

In the district trials, conducted by the Deputy Director of Agriculture, S. C. D., Poona, half an acre of mixture was grown along side with half an acre of local *Bajri* in four different villages, with four separate trials in each village. From the report of the Deputy Director of Agriculture, it is observed that the mixture has proved superior to individual local strains. The village trials are being continued.

Grass Research.

The large scale experiment on rotational grazing being carried out at Wadki Kuran, near Diva Ghat, is in its second year of trial.

The number of animals put to grazing during the year under report was 200. The grazing commenced on the 16th of August 1932, and lasted till the end of February 1933. As compared with the previous year the

period of grazing was extended by two more months on account of the sufficiency of feed available. Animals were shifted from block to block according to the availability of the feed and the nature and growth of the vegetation. As usual rock salt was kept in the area so that the animals could be induced to graze the coarse type of grass. The animals kept healthy throughout the year.

The Wadki Villagers have come to realise the advantages of the rotational system of grazing and are very keen that the experiment should be continued for a few more years, even at more cost to themselves. The Villagers of Ioni-Kulbhor within whose forest limits the grazing area lies are now clamouring for taking the experimental area on lease as they too have come to realize the advantages of controlled over open grazing. This is really a step further in the progress of the work.

In the grazing area some places dominated by spear grass (*Andropogon contortus*) have been marked out for studying the invasion during the next season.

A new feature of this year's work was the taking on hand of land development on a small scale in the experimental area. This was done in order to reclaim land denuded of grass vegetation and which are eroded by *nalas* and gullies. Small bunds along contour lines were constructed in flat and slopy areas, deep and shallow gullies were also bunded in several places. The result of bunding was evident from a good deal of silt held back which was washed by the heavy rains that precipitated in September 1932.

Striga Research.

Experiments to determine the conditions influencing germination of *Striga* seed was made in the laboratory, and it has been shown that fairly high humidity and temperature (30-35°C) are essential for seed germination which is also dependent on the contact of the host (*Jowar*) with the seed. However, it has been made possible to germinate *Striga* seed in the absence of contact with the host on an agar medium containing extract of juice from leaves, stem, and roots of *Jowar*, thus showing that the stimulus is of the nature of a chemical.

The experiment is being continued on the same lines to determine more accurately the different conditions influencing seed germination. Laboratory experiments are also being devised by which to determine the capacity for resistance of *Jowar* to *Striga* attack, which will prove useful in making new selections.

Preliminary Investigation on Ganja Cultivation, Harvesting and Storage.

This piece of work was taken up in November 1932 at the suggestion of Mr. A. M. Macmillan, then Commissioner of Excise, Bombay, for which a sum of Rs. 300 was sanctioned by the Government for expenses. Mr. N. R. Bhat, B.Ag., was appointed as Investigator to work under the direction of the Economic Botanist and Kaudgaon in Ahmednagar District was chosen as the place of investigation.

As a result of the investigation it has been found that the ganja crop of the cultivator in Ahmednagar district is impure and is a mixture of different varieties, principally red and green types and segregates resulting from a natural cross fertilization between these two types.

Ganja Hemp (*Cannabis sativa*) readily responds to change in environment, particularly to moisture, manure and spacing. The relation of age and sex of inflorescence to yield, the occurrence of intersexual types have been observed and the results recorded. The changes that take place during threshing and subsequent storage were carefully gone into and suggestions for paying more attention to details of threshing operation, on which the quality of ganja rests, have been embodied in a report submitted to the Commissioner of Excise.

Cytology.

Cytological investigation on the cause of sterility in 1027 A.L.F. cotton has been completed. The Cytology of Lintless Cotton and *Cephelandra indica* is nearly complete and the result of these will be published as soon as possible. Investigation on Cytological lines of some of the economic crops have been taken up for future work.

Botanical Teaching.

The Economic Botanist to Government was assisted by the Assistant Professor of Botany and Demonstrator in Botany in teaching Botany and Plant Breeding to the students of I.Ag., Jr. and Sr. B.Ag. classes. During the year 15 students had elected Plant Breeding as their Optional subject. At the University examination for the degree of B.Ag., out of 17 candidates who appeared in the subject of Plant Breeding 15 came out successful. The teaching work continues to be satisfactory.

Seed Testing.

The activities of seed testing section were continued as in the past. The total number of seed samples tested was 391 as against 303 in the previous year. Experiments on testing the longevity of seeds are still being continued since some of the samples (leguminous) under trial for eleven years have not yet lost their viability. The result of further experiments on longevity of seeds since 1928 is being prepared for publication.

The study of longevity of different kinds of annual and perennial grass seeds of this presidency will be taken on hand during the ensuing year.

Miscellaneous.

In supplying information, one of the important work done was the preparing of an exhaustive list of all the economic and cultivated plants in this presidency for supplying to the Director, Royal Botanic Garden, Kew, England, to aid in the Inter Imperial Scheme for introduction of new plants. To prepare this list giving detailed information regarding

each plant, Mr. H. P. Paranjpye was specially appointed in view of his experience as a Systematic Botanist and it took him two months to complete the work.

The Economic Botanist had opened stalls in the Pandharpur Agriculture, Cattle and Health Show and Betegam Agricultural and Cattle Show. Specimens of the best types of grasses suitable for the respective tracts were exhibited. A model illustrating the method of rotational system of grazing was shown and the principle underlying this system was explained in vernacular to the cultivators and peasants who had come to visit the Show.

As in the past a large number of enquiries have been attended to and requests for identification of various plant specimens complied with. The total number of specimens identified during the year was 245. Enquiries for supply of seeds, plants and publications from various places in India and abroad such as America, Australia, Africa, Egypt, Russia and Scotland have received proper attention. Several requests for a supply of sets of spineless cactus for planting for fodder have been received and as far as possible the demand is met with.

Publications.

The following publication was contributed by the Economic Botanist and the members of the staff :—

Name of publication.	Author.
"Grassland Problems in Western India", Department of Agriculture, Bombay, Bulletin No. 171 of 1932.	W. Burns, L. B. Kulkarni and S. R. Godbole.

L. S. S. KUMAR,
Acting Economic Botanist to Government,
Bombay Presidency, Poona.

**Programme of work under the Economic Botanist to Government of
Bombay, Poona, for the year 1933-34.**

- (1) *Bajri*.—A replicated test of three Poona selections, their mixture, along with local will be carried out according to Latin Square method.
- (2) *Grass*.—Rotational grazing experiment at Mangdara Kuran, near Diva Ghat, will be continued with the addition of land development work and the study of invasion of Spear grass (*Andropogon contortus*).
- (3) *Striga on Jowar*.—Further work on critical determination of conditions influencing germination of *Striga* seeds will be carried out. A laboratory test by which to determine the capacity of resistance to *Striga* attack by *Jowar* is being worked out.
- (4) *Orbanché in Tobacco*.—Conditions influencing the germination of seed will be taken up for study.
- (5) *Cytology*.—Investigation on the Cytology of *Cajanus indicus*, Rice mutant, hybrid of wild and cultivated *Bhendi* will be conducted.
- (6) *Linseed*.—Trial will be made to introduce desirable types from outside the presidency and make selection from the material available in the presidency.
- (7) *Weed*.—To conduct experiment for eradication of weeds at Bhivapuri Power Station and Western India Golf Club, Nasik.
- (8) *Longevity Test*.—An experiment to determine the longevity, percentage of germination and dormancy period of annual and perennial grasses of this Presidency will be taken on hand.

APPENDIX J.

SUMMARY OF WORK DONE UNDER THE CROP BOTANIST TO GOVERNMENT OF BOMBAY, KARJAT (KOLABA), FOR THE YEAR 1932-33.

During the year under report Mr. B. S. Kadam held charge of the post of the Crop Botanist.

Mr. V. K. Patankar continued to be in charge of the Rice Breeding Station, Karjat, except during the period from January to May 1933 when he was on leave. Mr. N. R. Bhat acted as Superintendent during that period.

Messrs. B. Nazareth and D. B. Barve continued as Graduate Assistants in wheat and Bajri respectively at the Cereal Breeding Station, Kundewadi (Niphad).

Rice Breeding Station, Karjat, Kolaba.

On the whole the season was favourable with a well distributed precipitation of 123 inches.

Season plot of K42.

2. The yield of the season plot was 2,242 lbs. of grain and 2,380 lbs. of straw per acre. The ratio of straw to grain was 1 : 1.06.

Replication of Improved Strains.

3. *Early Kolamba strains.*—The replications consisted of the standard early strains K184, K510 and K520. Ghosalwel and a new selection K501. The latter is derived from "K401" which has definitely proved impure in every important agronomic character (see below under "K401").

The replication shows significant strain differences. K501 shows 11.8 per cent. increase over the general mean, while K184 is 6.76 per cent. less to the general mean.

The experiment will be continued.

4. *Mid-late replications.*—In this experiment two new strains K540 and K550 were included for the first time along with K153, K530 and local Halwar. The two new strains showed increase over the general mean of which K540 is significantly superior, showing a superiority of 11 per cent. over the general mean.

The strain K530, K153 and Halwar do not show any significant differences over four seasons.

5. *Late Kolamba strains.*—The replication was conducted with K42, K226, K560, K570. Only K226 shows significant difference over other strains. However, none of the strains show any significant yield difference over the four seasons (1929-32).

The experiment will be discontinued.

6. *Bhadas replication.*—This year again the experiment did not show any significant strain differences. The comparison over the four seasons, 1929-32 shows that none of the strains are superior to local.

The experiment will be discontinued, but sufficient seed of each strain will be grown for district trials.

Reselection in Bhadas will be undertaken next year.

7. *Comparison of K42 and K226 with Kolamba Local.*—The two standard late strains K42 and K226 were compared with local Kolamba, obtained from village "Gulsund" in Panwel taluka. The experiment does not show any significant strain differences. The test will be continued.

Selection from hybridized material.

8. K401.—The strain "K401" has definitely proved to be splitting in flowering, yield, tillering, height of plants and grain size. Plants flowering as late as K42 have been isolated.

The bulk "401" has been entirely discarded and only promising selections have been retained.

It is recommended that "K401" should not be distributed in the districts.

9. The F_2 generations of crosses between K42, K226, Bhadas 52 were grown during the season. A cross between K79 and Patani 6 is also being exploited. A number of desirable selections have been made.

Selection in Zinya.

10. Out of the 500 selections only 291 were grown during the year. This number will be further reduced next year.

District trials of Bhadas.

11. Bhadas 52 was tried this year in the village Bhale in Mahad taluka and yielded 1,796 lbs. against 1,692 lbs. of local. The trial will be repeated next year.

Seed distribution.

12. In all, 1,920 lbs. of pure paddy seed of improved strains was supplied to the Deputy Director of Agriculture, N. C. D., Nasik, for multiplication and subsequent distribution among the cultivators.

Cereal Breeding Station, Kundewadi (Niphad).

Wheat Breeding.

13. The season on the whole was favourable. The total rainfall was 31.98 inches.

Replication of Improved Strains.

14. Instead of having two separate sets of replications both the Bansi and Bansipalli strains were replicated eight times in a Latin-square for the first time during the year under report. The size of the plot was one guntha.

The experiment showed significant strain differences. However, none of the strains was significantly superior either to the general mean or to the local. The strain 809 and Pusa 4 were inferior to the general mean.

The calculated yields of the strains were as follows :—

Strain No.	Yield per acre.	
	Lbs.	Oz.
103	1,041	9
168	1,039	11
808	1,027	13
162	1,015	15
224	982	13
Local	982	13
809	891	9
Pusa 4	758	12 (Corrected)

Synthetic Selections.

15. Three hundred and thirteen selections in the F_5 generation of Bansi X Khapli crosses and one hundred and fifty-six selections in F_4 of the Baxi-Khapli crosses were grown during the year. The results are not yet available. The best selections will be continued further.

District Trials.

16. *Trials in Khandesh.*—At Nizar, in Nandurbar taluka, strain 162 and 168 yielded 746 lbs. and 490 lbs. respectively, while the yield of local was 392 lbs. per acre.

In Shahada taluka strains 162 and 168 were compared against local at Bhaliada. The yields per acre were 1,380 lbs., 1,640 lbs. and 1,300 lbs. respectively.

At Rotwad, in Erandol taluka, the yield of 224 was 352 lbs. against 312 lbs. of the local.

These strains are valued at Rs. 4 to 5 more per "Map" of 720 lbs. over the local.

17. *Trials in Nasik District.*—The strains 808 and 809 were tried at Khapadi, Pimpalgaon and Ambewani. The yields per acre were as follows :—

Village.	Taluka.	Yield per acre in lbs.		
		St. 808.	St. 809.	Local.
Lonarwadi	Sinnar	550	500	..
Do.	Do.	506	500	425
Kopdi	Do.	400	380	360
Pimpalgaon	Niphad	720	960	880
Do.	Do.	420	448	448
Ambewani	Dindori	560	700	560
Do.	Do.	540	612	612
Average		528	585	548

The strains 808 and 809 more or less yield the same as the local. These strains command a premium of one rupee more per maund of 192 lbs. on account of larger and more uniform grain and superior luster.

The strain 808 is more popular than 809 as it is early by about a fortnight to the local.

The multiplication of 808 and 809 has been taken up at Jalgaon Farm.

The strains 808 and 809 should be compared at least two more seasons in the districts.

18. *Trials in Gujarat.*—The strains 808 and 809 were tried for the first time in Dholka taluka. Both the strains were irrigated and compared with Chandushi wheat. The strains have given very poor yields as compared to the local. It should be stated that these wheats are regarded suitable to dry conditions only.

In Dhandhuka 808 was compared with 224 where the latter out-yielded the former by 60 lbs. per acre.

These strains should be tried *under dry conditions* for at least three more seasons.

19. *Trials in Dharwar.*—In trials in Dharwar and Bijapur districts, the improved strains 808 and 103 yielded 624 lbs. and 615 lbs. per acre against the 478 lbs. of the local. The season was favourable and there was no rust.

Report of Ralli Brothers.

20. The four improved strains, 806, 807, 808 and 809 were analysed by Ralli Brothers. Their report shows that the quality of the strains was very much superior to the hard yellow wheat produced in Khandwa. The improved types will always find a ready market in India, specially in Bombay, where hard yellow wheat is largely consumed by the richer class of Indians. If produced in large quantities, and should there be any exportable surplus Italy and France are likely to take up these strains.

Bajri Breeding.

21. The season was unfavourable and due to extensive attack of insects the stand of the crop was very gappy. The first year was devoted to eliminating the bad lines. The work in future will consist of ear-to-row selections and mainly intensive inbreeding with a view to obtain foundation stocks for hybridization in future.

Gram Breeding.

22. Selections in this important crop have been taken up. The work will be expanded, if facilities permit.

Publications.

23. Kadam, B. S. and G. G. Patil.—Blooming and Anthesis in Kolamba rice. Indian Journal of Agricultural Science (in press).

B. S. KADAM,

Crop Botanist to Government of Bombay, Karjat.

**Programme of work under the Crop Botanist to Government, Karjat,
Kolaba, for the year 1933-34.**

Rice Breeding Station, Karjat, Kolaba.

RICE BREEDING.

- (1) Replication of improved strains.
 - (a) Early Kolamba strains.
 - (b) Mid-late Kolamba strains.
 - (c) Late strains K42, K226, Kolamba local and Zinya local.
- (2) Selection in Bhadas.
- (3) Row replication of Zinya selections.
- (4) Selections from hybridized material.
 - (a) Purification of strains from "K401".
 - (b) F_3 selections from K79 $\times$ Patani 6 cross.
 - (c) F_3 selections from B52 $\times$ K226 cross.
 - (d) F_3 selections from B52 $\times$ K42 cross.
 - (e) F_3 selections from K42 $\times$ K226 cross.
 - (f) Selections from crosses of various combinations.
- (5) Studies on the inheritance of important agronomic and morphological characters in rice.
- (6) Village trials of Bhadas strains.
- (7) Selections in Val (*Dolichos-lablab*).

Cereal Breeding Station, Kundewadi (Niphad).

WHEAT BREEDING.

- (1) Replication of improved wheat strains.
- (2) Selection in hybridized material.
 - (a) F_5 selections from Bansi-Khapali crosses.
 - (b) F_5 selections from Baxi-Khapali crosses.
- (3) District trials.
 - (a) Trials in Nasik.
 - (b) Trials in Khandesh.
 - (c) Trials in Ahmednagar.
 - (d) Trials in Gujarat.
 - (e) Trials in Dharwar.
- (4) Studies in the inheritance of agronomic and morphological characters in Bansi wheat.

BAJRI BREEDING.

- (5) Intensive inbreeding in various Bajri strains.
- (6) Comparative study of Akola, Poona strains and Niphad local.
- (7) District trials of Poona strains.

GRAM BREEDING.

- (8) Selection in gram.

LINSEED BREEDING.

- (9) Selection in linseed will be undertaken from the next year.

APPENDIX K.

SUMMARY OF WORK DONE UNDER THE PLANT PATHOLOGIST
TO GOVERNMENT, BOMBAY PRESIDENCY, POONA,
FOR THE YEAR 1932-33.

During the year under report Dr. B. N. Uppal held the charge of the section of Plant Pathology.

Mr. G. S. Kulkarni retired from service with effect from 1st April 1933, since the cotton wilt work at Dharwar, of which he was in charge as Special Cotton Mycologist, was closed down from that date.

Mr. M. N. Kamat returned from the United States after an absence of about 15 months. He has obtained the degree of M.Sc. in plant pathology from the University of Minnesota. Mr. Kamat, however, continued to be on leave.

Mr. K. G. Kolhatkar was appointed to act as Assistant Mycologist *vice* Mr. M. N. Kamat on leave.

Government have sanctioned the continuance of the work on betel-vine wilt at Bassein for a further period of three years, i.e. until 31st March 1936. Government have also sanctioned a temporary post of Kamgar to assist the Betelvine Investigator in his work. Mr. J. S. Malelu continued to act as Betelvine Investigator.

Mr. N. T. Kulkarni continued to work as Sann Investigator in connexion with the sann wilt scheme financed from the Sir Sassoon David Trust Funds.

Education.

The Plant Pathologist to Government was assisted by the Assistant Professor of Mycology in the teaching of plant pathology at the College of Agriculture.

All the seven students specialising in Advanced Plant Pathology were successful in the University examination for the degree of Bachelor of Agriculture. Of these, Mr. V. P. Gokhale and Mr. E. J. Vevai stood first and third in rank, respectively, among the successful candidates in the B.Ag. examination. There are two post-graduate students under training. On account of limited facilities, applications from two other students to the post-graduate course in plant pathology were not considered.

Research.

1. *Wilt in betel vines.*—In a number of plots the disease was controlled by the application of Bordeaux mixture 2-2-50 at $1\frac{1}{2}$ gallons per *haral* (12-foot row) instead of 2 gallons. The disease was easily controlled in loose, well-drained soil; in poorly drained plots Bordeaux Mixture was not very effective.

The results obtained during the year indicate that it is always advantageous to treat plots before the vines are planted in October-November, although the plots treated at the time of lowering of vines in May or after

lowering can also be saved if the treatment is carried out with great care; but the latter treatment is usually expensive.

The plots treated with "Kerol" 1-800, 1-1,200 and 1-1,800 are in good conditions; but this fungicide has failed to check infection in diseased plots.

2. *Cumin powdery mildew*.—In village trials against cumin mildew in the Kaira district, the disease was completely controlled by the application of 20 lbs. sulphur per acre. The loss in check plots (diseased) averaged from 20 to 30 per cent. of the yield.

A method has been worked out by which it is possible to forecast the severity of mildew in any given year by studying the temperature records of the month of December. These results have been published in a departmental bulletin.

3. *Fusarium wilt in sann-hemp*.—Nineteen plants were selected from bulk samples grown last year, and these were selfed. With the exception of D-IX (Dharwar IX), the other plants either showed the yellowing of leaves accompanied by discoloration of the petiole or yielded the fungus in isolation.

The seed of 19 selections was sown in the infected bed during the year. The seed of one selection failed to germinate, and 8 selections proved completely susceptible. With the exception of selection D-IX, the progenies of other selections segregated into resistant and susceptible plants, thus indicating that these selections were heterozygous for wilt resistance. All the plants of selection D-IX, however, remained healthy.

Evidence has been obtained that, in sann-hemp which is a practically self-sterile species, there are some strains which are relatively more self-fertile than others. A technique (which still requires further testing) has been developed, by which it is possible to produce a large number of selfed seed in sann-hemp.

The results of a large number of experiments made during the year have shown that the fungus can be traced to pods, and in many cases it has been found growing on the seed in diseased pods. The seed is thus an important factor in the dissemination of the parasite.

It has been shown experimentally that the fungus produces a thermostable, toxic substance.

4. *Powdery mildew of peas*.—It has definitely been ascertained that one application (of 20 lbs. per acre) of sulphur made at about the time of flowering, i.e. 40-45 days after sowing, will effect complete control of powdery mildew of peas.

It has also been determined experimentally that the fungus perennates as dormant mycelium in diseased seed. The fungus in the seed can, however, be killed by presoaking the seed in water at room temperature for 6 hours and finally immersing it in hot water at 50° C. for 10 minutes. The thermal death points of the dry and presoaked seeds are as follows :—

Dry seed	..	..	70° C. for 10 minutes.
Presoaked seed	..	..	55° C. for 10 minutes.

The optimum temperature for germination of conidia lies between 22 and 24° C., and the conidia fail to germinate above 30° and below 10° C.

5. *Alternaria blight of cumin*.—Inoculation experiments have confirmed that the fungus (*Alternaria sp.*) is confined to cumin. The incubation period of the fungus is 3 days.

The spores of the fungus are dark brown, stout and often in chains of 2 to 6, and measure $13 \text{ to } 62\mu \times 6\cdot9 \text{ to } 24\mu$. The lengthwise septa vary from 1 to 8 in number, usually being 3, and the crosswise septa are 1 to 5, usually 1 or 2. In germination a germ tube protrudes from any cell of the spore.

The following is a summary of the physiological studies :—

(a) The optimum temperature for germination is 20° C. and the spores fail to germinate at 0° C.

(b) The thermal death point of the fungus lies between 45 and 50° C.

(c) The fungus can grow on culture media ranging from 3 to 12 pH, the optimum value for growth being 6 pH.

(d) The fungus was grown on neutral potato maltose agar, and made the best growth at 21° C. (laboratory temperature). At 0° C the growth is inhibited, and at 35° C the fungus grows very feebly.

(e) Of the seven liquid media tested, Meyer's and Richard's solution gave the best growth, the least suitable being Cohn's medium.

A number of vegetable media was also tested, and the rate of growth was uniform on almost all of them.

(f) The fungus remained viable for 21 days in the absence of oxygen.

The spores do not germinate in an oxygen-free atmosphere, but do so readily when restored to a normal atmosphere.

(g) The fungus has been shown to produce the following enzymes : lipase, protease, cytase, trypsin, amylase, amidase, erepsin, emulsin and inulase.

6. *Fig rust*.—Copodust, a proprietary compound of copper, gave very promising results in the control of fig rust at Poona. The application of dust was made at intervals of 1 and 2 months, and the quantity of dust applied was 15 lb. per treatment per acre.

At Dharwar, complete control of fig rust was secured by the application of sulphur dust at the rate of about 120 lbs. for 5 treatments per acre.

Experiments with sulphur dust at Saswad were spoilt on account of late rains.

7. *Sclerotium disease in potatoes*.—Experiments were made with Granosan for the control of *Sclerotium rolfsii* in potatoes on the Dharwar Farm. The fungicide was applied once in varying quantities around the base of plants in each "hill". The results were negative.

Arrangements have been made to test the value of "Kerol" for controlling *Sclerotium rolfsii* in potatoes.

8. *Macrophomina phaseoli*.—This fungus has been isolated from sorghum, papaya, castor, brinjal and bananas. The strain from sorghum has proved pathogenic to sorghum, and the castor strain can attack its host.

The fungus produces pycnidia on sorghum seedlings grown in Roux tubes. In the case of the papaya strain, pycnidia were observed when the fungus was cultured on potato dextrose agar.

9. *Virus Diseases of Plants*.—The Imperial Council of Agricultural Research has sanctioned the deputation of Dr. B. N. Uppal at a cost of £ 500 to study the latest advances in our knowledge of virus diseases of plants in England and the United States. On his return, Dr. Uppal will control research on these diseases financed by the Imperial Council of Agricultural Research.

10. *Black stem rust of wheat*.—Stationary slide exposures were made at 5 stations in the Bombay Presidency. The exposed slides were sent to Dr. K. C. Mehta in connection with his studies on the dissemination of wheat rusts in India.

Advisory work.

A large number of enquiries on plant diseases were dealt with during the year, and advice was given promptly whenever required.

Arrangements to demonstrate specimens of plant diseases and the appliances for their control were made at the agricultural shows in collaboration with the Divisional Deputy Directors of Agriculture.

The first stage in the disease survey of the Bombay Presidency has been completed, and these results are being prepared for publication in a departmental bulletin.

Miscellaneous.

The following diseases have been recorded for the first time in the Bombay Presidency :—

Uredo fici (= *Cerotelium fici*) on *Ficus bengalensis*.

Puccinia helianthi on sunflower.

A species of *Striga* on *Paspalum scrobiculatum*.

Peronospora trigonellae on *Trigonella foenum-graecum*.

Pestalozzia palmarum on undeveloped cocoanuts.

Uromyces fabae on *Pisum sativum*.

Oidium erysiphoides on *Zizyphus jujuba* Lam.

Sclerotium rolfsii on *Cannabis sativa*.

Macrophomina phaseoli on *Ricinus communis*.

Mosaic on *Helianthus annuus* and *Momordica charantia*.

Fusarium oxysporum (= *F. cubense*) on bananas.

Phytophthora palmivora on *Citrus aurantium*.

Leeina philippinensis on sugarcane.

Publications.

1. Uppal, B. N., and M. K. Desai. Physiologic specialization in *Sclerospora graminicola* (Sacc.) Schroet. Indian Jour. Agr. Sci. 2 : 667-678, 1932.
2. Uppal, B. N., and M. K. Desai. Cumin Powdery Mildew in Bombay. Bombay Dept. Agr. Bull. 169 : 1-16, 1932.
3. Uppal, B. N., and M. K. Desai. Two new hosts of the downy mildew of sorghum in Bombay. Phytopath. 22 : 587-594, 1932.
4. Uppal, B. N. *Rhizoctonia bataticola* on sorghum. Internat. Bull. Plant Protect. 6 : 38, 1932.
5. Uppal, B. N. *Sclerotium rolfsii* on cotton in Bombay. Internat. Bull. Plant Protect. 6 : 38, 1932.
6. Uppal, B. N. New diseases in Bombay Presidency. Internat. Bull. Plant Protect. 7 : 4, 1933.
7. Weston Wm. H., Jr., and B. N. Uppal. The basis for *Sclerospora sorghi* as a species. Phytopath. 22 : 573-586, 1932.
8. Control of Cumin Powdery Mildew. Bombay Dept. Agr. Leaflet No. 8 of 1932.
9. Control of the wilt in betel vines. Bombay Dept. Agr. Leaflet No. 3 of 1932.
10. Bordeaux mixture. Bombay Dept. Agr. Leaflet No. 2 of 1932.
11. Some insecticides, fungicides and appliances. Bombay Dept. Agr. Leaflet No. 3 of 1933.

B. N. UPPAL,
Plant Pathologist to Government.

Programme of work under the Plant Pathologist for the year 1933-34.

(1) *Betelvine Wilt*.—The use of manures such as Dhencha, sann (as green manure), cow dung and rice husk will be tried to see the effect on drainage.

Experiments will be continued in plots of 1931-32 to see as to how many applications of Bordeaux mixture are necessary in the second year to enable the crop to survive the attack of wilt.

Several ways of lowering the vines will be tried out.

Kerol (in three strengths of 1-800, 1-1,200 and 1-1,600) along with Bordeaux mixture will be tried.

(2) *Sann Wilt*.—The relation of soil temperature and soil moisture to development of wilt will be studied under controlled conditions (Soil temperature tanks).

Morphology and physiology of the fungus causing wilt will be studied.

Production of homozygous resistant and susceptible lines of sann hemp will be attempted.

Histological studies of the host in relation to the fungus will be made.

Studies in the physiology of sterility of sann hemp will be made.

(3) *Rhizoctonia disease of Jowar*.—The relation of soil moisture and soil temperature will be further investigated.

Morphology and other physiological studies of the fungus will be made.

(4) *Fig Rust*.—Trials to find the critical quantity of 80 per cent. sulphur, and copodust (proprietary compound) required for effective control will be made.

Experiments will also be carried out to find the appropriate interval between applications.

(5) *Citrus gummosis*.—Experiments will be carried on to determine whether the fungus causing gummosis of citrus is *Pythiacystis citrophthora* Sm. and Sm. as originally described. Measurements of sporangia chlamydo-spores, etc. will be made and physiological studies such as temperatures, humidity etc. in relation to germination of spores and growth of the fungus will be attempted.

(6) *Alternaria blight of cumin*.—Several leguminous hosts will be exposed to alternaria fungus of cumin.

Methods of oversummering will be determined.

(7) *Sclerotium rolfsii* on potatoes.—Experiments will be conducted at Dharwar on the control of *Sclerotium rolfsii* on potatoes by the application of kerol around the bases of plants in the field.

(8) *Powdery mildew of peas*.—The value of dusting sulphur at the time of flowering will be tested on a large scale at Mahableshwar.

(9) *Powdery mildews*.—Studies of the powdery mildews on the hitherto unreported hosts will be made.

(10) *Bacteriophage*.—The potency of the bacteriophage will be "built up". General tests will be made.

(11) *Wheat rust*.—Co-operative studies with Dr. K. C. Mehta, Professor of Botany, Agra College, Agra, will be continued.

Investigation into the methods of overwintering of the rust in the Bombay Deccan will be made. A small plot of wheat affected with rust will be maintained throughout the summer.

M. K. PATEL,

College of Agriculture,
Poona, July 7, 1933.

Acting Plant Pathologist to Government.

APPENDIX L.

SUMMARY OF WORK DONE UNDER THE SOIL PHYSICIST TO THE
GOVERNMENT OF BOMBAY, FOR THE YEAR 1932-33.

The undersigned held charge of the post of the Soil Physicist throughout the whole year. The only graduate Assistant Mr. G. M. Bapat, M.Ag., was on leave for one month during September 1932. Mr. T. R. Gholap, the office clerk, was on leave for a period of four months, from June to October. His place was taken by the non-graduate assistant, Mr. S. R. Gadakari. Thus increased work was required to be done with reduced staff for part of the busy season.

The problems of dry farming continued to be investigated at the Dry Farm Experimental Station, Manjri, with limited and reduced staff and also with reduced resources.

During the year under report, previous year's experiments were repeated in the *kharif* and *rabi* seasons. This is the ninth year for experiments with *rabi* jowar and the eighth year for experiments with *kharif* crops of bajri and tur.

Season.—The year 1932-33 can be called a year of heavy rainfall, the total rain being 32.05 inches. The total rains exceeded the annual average by nearly 11 inches. Since the commencement of the Dry Farm Station in 1924, this is the heaviest rainfall received and hence the results are likely to be interesting. Similar heavy rain was received 17 years back in 1915, the rain being 32.99 inches. The total number of rainy days during the year was 80. The rainfall from March to May amounted to 3.83 inches and may be counted as hot weather rains; the rainfall from June to the middle of September amounted to 15.48 and be reckoned as *kharif* rain, while the remaining rain from middle of September to the end of December was 12.74 inches and is reckoned as *rabi* rain. The *kharif* rains are above normal by about 3 inches or 25 per cent. The number of rainy days during the *kharif* season from June to the middle of September was 49. The rain in the month of June was inadequate as there was only one inch of rain, instead of the normal average of nearly four inches. The rainfall in July, August and the first fortnight of September was more than the average normal. But on account of the delayed sowing of *kharif* crops to the third week of July, the later *kharif* rains could not give very heavy yields. The moisture at the *rabi* sowing was sufficient. The rainfall during the *rabi* season from the middle of September to the end of December was far above the annual average rain of the season, and was more evenly distributed than usual, there being some rain every month. The October rains were heavy being 9.09 inches instead of average of 2.48 inches. This larger amount of rain kept up enough moisture in all the plots irrespective of any treatments given to them and hence the results of yields of differently treated plots are not showing marked variations, due to extra amount of moisture being made available. But the excessive wetness of the *rabi* season proved favourable to various insect

pests and fungoid diseases. The results of *rabi* jowar are thus very highly vitiated. The other climatic factors are given below :—

The mean maximum temperature varied from $79\cdot10^{\circ}$ F. in July to $97\cdot8^{\circ}$ F. in April, while the mean minimum varied from $46\cdot3^{\circ}$ F. in January to $71\cdot2^{\circ}$ F. in June. The average humidity recorded at 8 a.m. varied from $61\cdot2^{\circ}$ F. in April to $85\cdot8^{\circ}$ F. in August.

The rate of evaporation from a free water surface was highest in the month of April and lowest in the month of July.

Kharif crop.—The previous year's experiments with bajri and tur mixture were repeated in triplicate to find out (1) the effect of bunds as against no bunds ; and (2) the effect of stirring the soil to different depths as against no stirring ; (3) there were triplicate plot to imitate the cultivator's method ; (4) series in triplicate with farm yard manure at the rate of eight cart-loads per acre every year, were also tried during the year. The results of yields of bajri and tur are given in the following table. They are calculated per acre from the average yields of the three replicated plots :—

(1) The results of the first series indicate the advantage of placing small bunds to stop the run-off of heavy rains. The extra grain in banded series amounts to 13 per cent. and the straw amounts to 21 per cent. over the non-banded and the results are statistically significant.

(2) Due to timely and sufficient rains after sowing no advantage of stirring the soil was observed in the mulching series of banded plots, but in the non-banded series 12 to 14 per cent. of extra grain of bajri was obtained by mulching.

(3) The cumulative effect of the additions of farm yard manure in moderate quantities every year is again obvious during this year. The extra yield of grain amounts to as much as 80 per cent. while the straw has almost doubled.

(4) The cultivator's method shows an advantage over the Dry Farm method on account of its heavy plant population which got adequate moisture supply by the heavy and well distributed rains of the year during the growing period of the crop.

Other kharif crops.—Nilwa as a fodder was tried on one guntha. The fodder obtained was 234 lbs. per guntha. Other *kharif* varieties of jowar such as Satpani, Gidgap and Aispuri and four American varieties were tried. But none of them were found promising so far as the grain production was concerned.

Rabi crop of Jowar.—All the experiments of the previous year are repeated in four replications. The following are the important series :—

(1) Testing the effect of bunds over no bunds. (2) The second series is meant to find out the effect of stirring the surface soil so as to form a mulch of varying thickness over no stirring. This mulching is tried both in the banded and the non-banded plots. (3) In the manurial series, (a) Farm yard manure was added at the rate of 8,000 pounds per acre; (b) addition of green manure was tried by growing sann and chavli during the *kharif* season, (c) artificials like sulphate of ammonia and nitrate of

soda were tried in duplicates. (4) The fourth series consisted of replicated plots to determine the advantage of different preparatory tillage such as (a) ploughing, (b) cross harrowing with a tine-tooth harrow, and (c) harrowing with a blade harrow. (5) For comparison, plots were laid down according to the usual method followed by the cultivator. (6) Several minor experiments were tried in replications, where possible, to determine (a) the optimum density of plant population, (b) the depth of sowing, (c) the time of sowing, (d) the effect of weeds, and (e) the effect of fallow.

On account of the exceptionally heavy rains of the year the results have been highly vitiated not only by the excessive moisture but by numerous vitiating factors like insect and fungoid diseases. Water which is the limiting factor in dry farming was in excess in the soil throughout the growing period of the crop. Hence the experiments intended to conserve more water and make it available for growth did not show any advantage.

The results are given in the appendix and have been calculated per acre from the average of four or more replications arranged by randomizing.

The figures of yields of the different series of experiments bring out the following conclusions :—

(1) No advantage is seen by placing small bunds to prevent run-off during the current year of exceptionally heavy rain.

(2) Mulching has not resulted in giving any benefit either in the bundled or non-bundled series.

(3) In the manurial series, addition of farm yard manure has given about 23 per cent. increase in grain and nearly 56 per cent. increase in straw as compared to the control. The green manures have not given any increase and the artificials have given reduced yields instead of any increase.

(4) In the cultivation series ploughing with a C.T. 2 plough has given nearly 19 per cent. higher yield of grain than the crosswise harrowing with the tine-tooth harrow. Blade harrowing has given this year a slightly greater yield than the tine-tooth cross-harrowing.

(5) The dry farming method when compared with the cultivator's method has given only 11 per cent. higher yield of grain.

Other investigations—(a) Surface run-off of rain-water and soil erosion.—The experiment was continued during the year under report. The results obtained are of the same nature as those of the previous years, with a few exceptions. The annual rain fall amounted to 32·05 inches and was received on 80 rainy days. Out of this, 23·59 inches were received on 24 days when run-off took place. The loss of rain-water by run-off varied from 4·77 to 9·99 inches according to treatment. The amount of silt removed was the highest so far measured. The losses of silt calculated per acre varied from 14·38 tons to 66·36 tons during the year.

(b) The lysimeter experiment again showed that when the soil depth is more than three feet, the loss of water by drainage is very small, but with limited soil depth of 18 inches the same was found to amount to 10.49 inches.

(c) Studies in the evaporation of soil moisture indicated increased evaporation with increased rainfall of the year.

(d) A study of the water requirement of the jowar crop under plot-conditions was again carried out under controlled and improved conditions of experiments and has shown that the actual water taken up by the crop is very small in comparison to the amount lost in other ways.

A large scale trial on the Mohol Farm in Sholapur was also carried out. The rainfall at Mohol was exceptionally heavy and the results have not given any increased yield by the dry farming method.

District Trials of dry farming methods.—With the help and co-operation of the Deputy Directors of Agriculture for South Central Division and Southern Division, numerous trials on cultivators' fields were carried during the year under report, in Poona, Ahmednagar and Bijapur districts. The area under the improved dry farming method is gradually increasing and there are signs of still more rapid increases in the near future. The results during the year of more than average rain, are encouraging. Though the increases over the local method are not as high as during the years of moderate or deficient rains, still the extra yields are enough to convince the cultivator of the superiority of this method even in a good year.

In Ahmednagar District the experiment was tried at 33 different centres and the number of plots was 44. The total area under the experiment was 232 acres. The average yield per acre amounted to 455 lbs. of grain and 1,920 lbs. of straw, while the average yield by Local method amounted to 360 lbs. of grain and 1,674 lbs. of straw. Thus the percentage increases amounted to 26.3 and 11.4 in grain and straw respectively over the local method.

In Poona District the method was tried at three centres. The number of plots was 9 and the area amounted to 200 acres. The average yields amounted to 579 lbs. of grain and 1,190 lbs. of straw as compared to 404 lbs. of grain and 970 lbs. of straw obtained by the local method.

In Bijapur one experiment on the scale of a holding was tried at Halli about 11 miles from Bijapur on the Bagalkot road. Half the area viz. 20 acres was occupied by jowar and the remaining area by cotton. The season was unfavourable for jowar. The yields of jowar were 291 lbs. of grain along with 18 lbs. of linseed by the dry farming method while the local method gave 238 lbs. of jowar grain and only 9 lbs. of linseed. Thus the increase in jowar grain amounted to 22 per cent. The straw by the dry farming method was however lower being nearly two-thirds of that obtained by the local method.

Extension Work.—This section was fully represented at the large district Agricultural Show at Pandharpur—opened by His Excellency

the Governor of Bombay in October 1932. The section was also arranged at the Agricultural Show at Indapur later on. Illustrated lectures were given at both these shows. The standing crops by this method in Poona and Ahmednagar districts were visited by the Soil Physicist or his graduate assisstant and illustrated lectures were given at several places visited during the tours.

The limited staff has again put in a year of heavy and strenous work. It is gratifying to note that the long awaited sanction to the dry farming scheme sent by the Bombay Department has been given by the Governing Body of the Imperial Council of Agricultural Research. The scheme is expected to be launched during the comming rabi season and the preliminary work of testing the uniformity of the land will be carried out until the Laboratory and Office get ready for full work.

N. V. KANITKAR,

Soil Physicist to the Government of Bombay.

Statements showing the yields of Bajri and Tur for the year 1932-33 on the Dry Farm Experimental Station, Manjri, tried in triplicate (one guntha each).

(The results are given from the middle area after deducting a ring plot and calculated per acre.)

Treatment.	Yields per acre		
	Bajri grain lbs. per acre.	Bajri fodder lbs. per acre.	Tur grain lbs. per acre.
	lbs.	lbs.	lbs.
(1) <i>Bunds versus No Bunds—</i>			
Flat	623	1,699	352
Bunded plots	706	2,064	398
(2) <i>Mulching series—</i>			
(a) Flat and No Mulch	572	1,553	333
Flat and 1" Mulch	644	1,872	356
Flat and 2" Mulch	654	1,673	366
(b) <i>Bunded series—</i>			
Bunds and No Mulch	792	2,091	463
Bunds and 1" Mulch	640	1,951	380
Bunds and 2" Mulch	687	2,151	353
(3) <i>Effect of F. Y. M—</i>			
Bunds, 2" Mulch and F. Y. M.	1,247	4,083	530
(4) <i>Cultivators' Method—</i>			
Cultivators' Plot	899	2,370	323

*Statement showing the yields of Rabi-Jowar per acre in 1932-33
on Dry Farm Experimental Station, Manjri, tried
in four replications (one guntha each).*

(Results are given from the middle area after deducting a ring plot all round and calculated per acre.)

Treatment.					Grain per acre.	Fodder per acre.
					lbs.	lbs.
<i>Bunded series—</i>						
No Mulch	..	..	..	..	777	1,798
1" Mulch	..	..	..	..	829	2,029
2" Mulch	..	..	..	..	725	1,731
3" Mulch	..	..	..	..	771	1,739
<i>Flat Series—</i>						
No Mulch	..	..	..	..	957	2,407
1" Mulch	..	..	..	..	737	1,438
2" Mulch	..	..	..	..	770	1,654
3" Mulch	..	..	..	..	768	1,371
<i>Flat versus Bunded Series—</i>						
Flat	..	..	..	..	808	1,717
Bunded	..	..	..	..	776	1,824
<i>Manurial Series—</i>						
Bunds, 2" Mulch and F. Y. M.	..	..	..	..	897	2,721
Bunds, 2" Mulch and Sann Green Manure	..	..	..	..	632	2,116
Bunds, 2" Mulch and Choli Green Manure	..	..	..	..	746	2,471
Bunds, 2" Mulch and AmSo ₄	..	..	..	..	567	1,285
Bunds, 2" Mulch and NaNo ₃	..	..	..	..	633	1,436
Bunds and 2" Mulch	..	..	..	..	725	1,731
<i>Cultivation Series (Bunds and 2" Mulch)—</i>						
Deep Ploughing	..	..	..	..	1,107	3,198
Tine-tooth harrow	..	..	..	..	925	3,000
Blade harrow	..	..	..	..	998	3,254
<i>Control-Standard Dry Farm Method</i>					892	2,030
<i>Cultivators' Methods—</i>						
Flat and seed sown with 9" Drill at the rate of 6 lbs. per acre	..	..	..	..	802	2,582

*Statement showing the yields of Rabi-Jowar per acre on the
experimental plots on cultivators' fields in the Districts
during 1932-33.*

Ahmednagar District.

	Acres.	Gunthas.
Area cropped with Dry Farming Methods ..	232	32
Area cropped with local methods ...	194	28

Plots 44 at 33 centres.			Average yield grain lbs. per acre.	Average Fodder lbs. per acre.
			lbs.	lbs.
Dry Farm Method	..	..	455	1,920
Cultivators' Methods	..	..	360	1,674

Poona District.

			Acres.
Area cropped with Dry Farming Methods	..	..	200
Area cropped with Cultivators' Methods	..	..	200

Plots 9 at 3 centres.			Average yield grain lbs. per acre.	Average fodder lbs. per acre.
			lbs.	lbs.
Dry Farming Methods	..	..	579	1,190
Cultivators' Methods	..	..	404	970

*Statement showing the yields of rabi-jowar per acre at Halli
in Bijapur District, on Unit Holding Scale.*

Treatment.	Area Acres.	Jowar grain per acre.	Jowar fodder per acre.	Linseed lbs. per acre.
Jowar under experiments (wide sowing and interculturing)	20	291	663	18
Check	20	238	1,093	9

Programme of Work of the Soil Physicist during the year 1933-34.

(1) *Experiments with Kharif Crop of Bajri and Tur.*—Only a smaller number of experiments are laid out during the year for the sake of confirmation, in four replications by randomizing. The effect of bunds will be compared with no-bunds and the effect of mulch of 2" thickness will be compared with no-mulch. The effect of the addition of Farm Yard Manure will be tested under the year's rainfall condition.

(2) *Experiments with Rabi-Jowar.*—As this section will be transferred to Sholapur at the beginning of the Rabi season, the area will be used for the final confirmation of some of the important findings of the previous five or six years' results. The important ones of these would be (1) the testing the effect of bunding and of mulching, (2) the effect of green manures and Farm Yard Manure, (3) the effect of different kinds of preliminary cultivation, and (4) there would be plots to imitate local cultivators.

(3) *Other Investigation Work.*—Surface run-off and erosion studies would be continued. The lysimeter experiments would also be continued. No other laboratory work would be conducted as the staff would be transferred to Sholapur by the beginning of October.

(4) *The Starting of the Dry Farming Research Station at Sholapur with a sub-centre at Bijapur.*—During the remaining part of the year only the preliminary work of taking the first crop of jowar for a uniformity test will be done. The laboratory building is expected to be completed. It would be fitted up for the soil and plant work with proper furniture and apparatus. Various other constructional works—like run-off tanks, lysimeter, plant-house etc., will have to be got ready for starting work during the following year of 1934-35.

(5) *District trials on cultivators' fields.*—These would be continued with the help of the Deputy Directors of South Central Division and Southern Division as far as possible. But this section will not be able to give much attention to this, on account of the heavy work of the new scheme sanctioned by the Imperial Council of Agricultural Research.

N. V. KANITKAR,

Soil Physicist to Government of Bombay.

APPENDIX M.

SUMMARY OF WORK DONE UNDER THE LIVE STOCK EXPERT
TO GOVERNMENT FOR THE YEAR 1932-33.

Personnel.—Mr. Edw. J. Bruen held charge of the Live Stock Section up to 13th April 1933 when he proceeded on leave and Mr. H. G. Baluch acted in his absence.

After the addition of staff last year the number of personnel during the year was as under :—

Nutrition Assistant	..	..	..	1
Divisional Inspectors of Cattle Breeding	..	..	..	4
Farm Managers	..	..	..	3
Assistant Farm Manager	..	..	..	1
Non-Graduate assistants	..	..	..	2
Clerks	..	..	..	5

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The activities of this Section are as under :—

- (i) Advisory work.
- (ii) Propaganda and teaching in villages.
- (iii) The breeding of pure strains of cattle on the Government Cattle Breeding Farms.
- (iv) The placing out of breeding bulls on the Premium System from those bred on farms and those purchased.
- (v) Holding of Shows and Demonstrations.
- (vi) Improvement of the milch buffalo.
- (vii) Propaganda in the storage of fodders as hay and silage.
- (viii) The conducting of Nutrition Experiments to ascertain value of concentrate foods and roughage fodders.
- (ix) The improvement of village poultry by placing out pure bred cocks in villages.
- (x) The supplying of poultry to private breeders and on concession rates to cultivators.
- (xi) Advice on the feeding of poultry and their care.

Advisory Work.—Nature of this work mainly consists of drawing up of plans and specifications for the establishment of private Dairy and Dairy farming concerns; Schemes for the improvement of major and minor live-stock; in many cases the sites require to be inspected.

The Schemes prepared during the year that need mention are as under :—

1. Poultry Scheme for proposed Borstal School at Vaisapur Temporary Prison (Dist. Ahmednagar).
2. Scheme for poultry Breeding Research in Western India.
3. Scheme for Goat Breeding Research in Western India.

(N.B.—Schemes Nos. 2 and 3 were submitted to the Imperial Council of Agricultural Research, Simla, for discussion at their sitting in August 1933.)

Propaganda.—Propaganda on the keeping, breeding and rearing of cattle and poultry was carried out in over 200 villages during the year. With the help of the Taluka Development Association, Chalisgaon and the Bombay Gowrakshak Mandali, the Divisional Inspector of Cattle Breeding, North Central Division, Jalgaon, carried out demonstrations on cattle improvement at four different centres. These were very well attended to by the interested public. In the Southern Division, poultry keeping appears to have engaged the attention of some people, as a result of which, farms with some birds have come into existence at Akkur and Dharwar in the Dharwar District and at Athni in the Belgaum District during the year. There appears to be some demand there for White Leghorn cocks for stud purposes, which could not be met for want of stock.

The Live Stock Expert was out in the district on tour for 153 days during the year.

Demonstrations.—The use of silage with methods of making it and its subsequent utilisation was demonstrated in villages as given below :—

Northern Division	.. Aligarh, Sahij and Aslali in Ahmedabad District and Abrama in Surat District.
North-Central Division	.. Shirpur in West Khandesh District.
Southern Division	.. Shiggaon and Yelvigi in Dharwar District.

Silage making has been taken up more or less by some of our previous experimenters especially at Koradur and Mudenur in the Southern Division.

SHOWS AND RALLIES.

The following shows and rallies were held during the year :—

Cattle Shows.

At the time of visit of the Honourable Minister for Agriculture to the Taluka Development Association at Bhusawal and Jalgaon, small cattle shows were organised at the places visited by the Honourable Minister. A few rupees were distributed here as prizes.

At the time of the Pandharpur Kartiki Fair, a Cattle Show was organised with great success. As many as 556 animals competed in this Show. The Show was largely financed by the philanthropic public of Bombay who contributed as much as Rs. 926 out of a total collection of Rs. 1,236. The Government and the Village Improvement Committee, Sholapur, also contributed to the funds for the Show. The Show was visited by His Excellency the Governor of Bombay and was a great success. People could see here a great contrast between the animals entering the Show from Sholapur District breeding zone and those from Man Taluka. The former possessed strikingly better qualities than the latter.

A Show was also organised at Devargud in the Southern Division, which was helped by the contribution from the Department. At this Show, cattle of the Amrit Mahal breed had also collected for competition. This Show is gradually becoming a cattle market and a cattle fair wherein considerable sales are being effected. Another Cattle Show was held at Athni where a sum of Rs. 216 was given away in prizes.

Cattle Rallies.

The following cattle rallies were held in the Northern Division during the year :—

(a) Chharodi Farm	∴ }	Ahmedabad District.
(b) Dholka	∴ }	

At the former, 17 villages were represented in all with 304 head of cattle, out of which 200 animals were the progeny from our Premium bulls.

Cattle Shows are getting more popular now-a-days. Cattle owners now-a-days are inclined to go in for improvement with less aid from Government than in the past.

Breeding Operations in the District.—As reported last year, the effect of the world trade depression has had its effect on the cattle industry during the year, tending to lower the price of live-stock to an appreciable extent. Hence much less buying and selling took place at cattle fairs.

Out of the grant of Rs. 4,500 placed at the disposal of this Section from the Sir Sassoon David Trust Fund, it was found possible to issue loans to 6 persons with the result that as many as 6 bulls could be put out during the year.

Premium Bulls.—The use of a known pedigree bull has now well impressed the cattle owners with right and permanent kind of improvement in their stock. But there are several hindrances in the way of putting the breeder on a sound foundation:—one is their natural tendency to do away with their young male stock with a view to avoid financial loss at a sale later on. Another equally important point is the disease, which appears every now and then in the herds of breeders and takes a heavy death toll of animals, they may have bred at great cost.

Work has progressed fairly well in the Ahmedabad “A” Zone, where 8 fresh bulls were put out during the year. In the North Central Division, 41 applications were received either for getting bulls at half the cost and continuation of maintenance charges for bulls already placed with them or for sanctioning maintenance charges to the bulls to be purchased with the consent and approval of the Live Stock Expert.

Good progress has been made in the Southern Division “A” Zone, 16 bulls being placed out in the Dharwar District and 3 in the Belgaum District during the year.

The following statement shows the number of Premium bulls working in the district :—

Zone.				Number of bulls working on 1st July 1932.	Number of bulls working on 1st July 1933.
<i>Intensive Breeding Zones—</i>					
1.	Chharodi	..	..	31	28
2.	Surat	..	..	9	7
3.	Satpura	..	..	11	41
4.	Sholapur	..	..	28	39
5.	Belgaum	..	..	2	5
6.	Bankapur	..	..	20	30
<i>The rest of the Presidency—</i>					
7.	South Central Division	..	..	1	2
8.	North Central Division	..	..	12+2 (Konkan).	9
9.	Southern Division	..	..	3	4
10.	Gujarat	..	..	18	20
Total				137	185

Registration of Cattle.—The work in this direction started last year has made a very satisfactory start and the number registered is as under :—

Breed.				Number of animals registered.
Khillar	..	..	..	72
Gir	..	..	..	53
Kankrej	..	..	..	150
Krishna Valley	..	..	..	22
Amrit Mahal	..	..	..	19
Total				316

Palghar Dairy.—The Palghar Infants and Public Milk Supply Company (Ltd.) is gradually improving its position and doing quite well. This is more like a Dairy Farm now. There has been a considerable reduction in the feeding of cattle resulting in good saving. This was possible due to growing of fodder and purchase of foodstuffs in cheaper markets. As to the question of drinking water supply, the resetting of the old well is in progress.

Sheep Breeding.—No progress has been made in sheep breeding. In the South Central Division, however, demonstrations in mechanical sheep shearing were given at three places, viz. Mhaswad, Malshiras and Indapur with the object of finding out the feeling of the shepherds towards the method. The shepherds agree that the working of the machine was far superior to the old method of hand-shearing. They, however, have certain other objections to the new method which time alone will overcome.

Poultry.—Of late, poultry farming has been engaging the attention of the public and several enquiries on this kind of cottage industry are being received in this Office. In the South Central Division where people appear to be taking keen interest in this class of farming, as many as 9 demonstrations in poultry keeping at various centres were carried out.

NORTHCOTE CATTLE FARM, CHHARODI.

Personnel.—Mr. M. M. Desai, B.Ag., held charge of the farm during the year except for a period of one month and fourteen days (from 18th May to 1st July 1932) he was on privilege leave. Mr. B. B. Jamsapjina, B.Ag., acted as Manager during Mr. Desai's absence.

Season.—The season as a whole with very high temperature reaching up to 122°F during the month of May, with only 78 cents of rain on 26th June 1932 and nearly continuous rain from July onwards till the end of the third week of August may very well be said to be quite unfavourable from the agriculturist's as well as the cattle breeder's point of view. The total rainfall for the season amounted to 22 inches and 79 cents, being a few inches below normal, and out of which 14 inches and 87 cents was recorded during the month of July only.

During the month of August it rained continuously for ten days, causing stagnation everywhere and without any sunny days. The total for the month amounted to 5 inches and 1 cent. and a chilly wet condition occurred, lowering the temperature to 71°F—an unusual phenomenon for August. Unusual fly and mosquito trouble became rampant. These conditions brought in foot and mouth disease among the cattle. With the advent of the sunshine by the fourth week of the month, the disease lost its virulence and died out by the end of the month. The disease, however, again made its appearance in a more virulent form spreading among all the herds of stock during the month of September.

The season, in the first place, started a bit late and when it started. it did not allow full time for cultivation and sowing, as rains began to pour down continuously, leaving all plots, sown or unsown, to grow rank with weeds. Marked stagnation prevailed throughout, there being no chance for interculture. In several cases, late sowings were done but due to absence of late rains and great heat during the months of September and October, no good harvest could be made.

CROPS.

Jowar.—As already stated before, all *kharif* crops failed due to water stagnation at one time and failure of late rains at another. However, the yield of crops was as under :—

Area.		Lbs.	Harvest.
A.	g.		
2	0	9,380	Green Jowar ensiled.
40	2	57,644	Kadbi.
		4,838	Grains.

Jowar from several plots, aggregating 17 acres and 10 gunthas failed, but produced green grass instead, up to 69,874 lbs. all of which was ensiled. Also certain plots meant for Jowar measuring 6 acres and 36 gunthas in all remained unsown and produced 38,825 lbs. of grass, all of which was ensiled.

Maize.—*Kharif* maize was sown on 4 plots measuring 9 acres and 12 gunthas, all of which failed due to stagnation and absence of inter-culture except one small plot which gave 7,056 lbs. of maize of poor quality. All the other plots grew rank with weeds.

A maize plot under irrigation during the spring of 1932 yielded 18,477 lbs. of maize and *chavli* mixture per acre, which was fed green.

Bajri.—Bajri was sown on 4 acres in all, but failed completely due to stagnation, the plots however, producing 18,564 lbs. of green grass.

Gram.—Gram was sown on 14 acres and 27½ gunthas but failed to germinate well due to lack of moisture in the soil on account of failure of late rains and subsequent absence of dew during period of growth. 910 lbs. of grain and 1,650 lbs. of chaff were obtained.

Berseem.—Berseem was grown on one acre of land and yielded in 5 cuttings a total of 60,050 lbs. (including 6,230 lbs. cut during April 1933). The growth was very rank in spite of absence of dew. The damage by wild animals particularly by hares along the border of the plot is great, several beds remaining stunted in growth due to nipping by the rodents.

Elephant Grass.—Elephant grass gave only 2,000 lbs. of green fodder out of an area of 2½ gunthas.

Silage-Making.—During the year, 2 pucca and 2 katcha pits were filled with 346,331 lbs. of grass at a total cost of Rs. 1,382-1-11.

Hay-Making.—During the year, only a small portion of land was reserved for making hay for use of the farm, a very large area having been given out on lease for cutting and carting away at a total realization of Rs. 4,650. No hay on account of Sir Sassoon David Trust Fund Scheme was made. The Farm made hay for its own use totalling 148,033 lbs. at a total cost of Rs. 267-8-0 or at Rs. 1-12-11 per 1,000 lbs. which includes the operations of cutting, carting and stacking loose in Dutch brans.

Livestock.—Nineteen heifers calved for the first time during the year as against 12 heifers last year. Of these, one has yielded over 4,000 lbs. and one over 2,000 lbs. Four more which have calved during the latter part of the year, have been yielding well and promise to be good yielders. This year, therefore, was better with regard to new heifers than the previous year. The improvement of the herd at Chharodi still continues. All the cows that calved this year have yielded at the pail.

Births.—During the year 84 per cent. of the breeding females dropped calves, showing good improvement on regularity of calving. The total number of births was 70, of which 42 were males and 28 females. One male calf born of cow Gomti (36-23) showed a birth weight of 71 lbs. Similarly, a male calf from cow Renchhi (33-25) weighed 63 lbs. at birth. The young bull calf of cow Ujol (16-27) has been showing all the signs of an early maturity and before 2 years of age has been taken up as a stud bull to serve a few cows.

Disease and Deaths.—The year was bad from the point of disease. Foot and mouth appeared thrice during the year—during the beginning of the month of August, middle of September and the month of March. Hæmorrhagic septicæmia appearing in March took a death toll of two animals. This disease, however, subsided soon after inoculations. A sporadic case of Dengue was also recorded during the month of March. The total number of casualties was 21, out of which 16 were of young ones up to 6 months of age dying mostly of premature and still and weak births.

Sale of bulls on Premium System.—As many as 17 bulls were issued on the Premium System during the year, out of which 10 went to Ahmedabad District, 6 to Surat District and 1 to Broach District. Thanks to the subscription in the aid of the indigent cattle breeders by the District Local Board, Ahmedabad, it has been always found possible to put out a good number of breeding bulls in this district.

Receipt of cattle.—Like last year, this year again a consignment of 12 young bulls was received from Surat Farm to be maintained and issued later on, on attainment of maturity.

Appendix I gives a detailed list of bulls placed out in the district.

Breeding Progress.—Greater conformation to type and size are being maintained by the bulls as seen from their progeny, but maturity and performance are factors more easily measured and these qualities are found prominent in the herd.

Milk yield.—We have had rather a very bad year from the disease point of view, which told upon the milk yield to a certain extent. The total production of milk for the whole year was 127,475 lbs. as against 131,648 lbs. during the previous year. The total number of cows handled for milk during the year was 78 as against 64, the year previous.

Appendix II gives the milk yield month by month for the 3 years, 1930-31, 1931-32 and 1932-33.

It will be seen that the milk yield is nearly steady all these years except for the months of July, August and September when good green grazing is available.

Progress of the Milking Herd.—A statement (Appendix III) showing progress in the yielding capacity of the Kankrej cows is attached. It will be seen from this that the progress made so far has been well maintained though, the average milk yield per animal that could be handled for milking has gone down by 27 lbs. and 1 oz. as compared with the previous year.

Service to the Public :—

- (1) A cattle rally was held at the farm and the Premium bull agents and others were given advice on how to take care of animals.
- (2) A student from Khandesh finished his training here and has since been in the employ of the Taluka Development Association.
- (3) A pair of bullocks is always being supplied to the Cotton Breeder, Viramgam, for his cultivation.
- (4) Silo demonstrations were carried out by the farm staff at Abrama (District Surat) and at Sahij near Dholka.

Visitors.—There were 214 visitors at the farm during the year.

Officers of the Baroda State visited the farm for selection and purchase of animals. An Officer of the Mysore State also came for the selection of cattle. A Japanese Veterinarian of the Government of Formosa visited the farm for the selection of cattle. Representatives of the Radhanpur State came for cattle purchase. The Imperial Entomologist from Pusa visited the farm to study the tract. Several Officers of the Bombay Agricultural and Veterinary Departments paid a visit to the farm.

CATTLE BREEDING FARM, BANKAPUR.

Personnel.—Mr. A. B. Gadagkar, G.B.V.C., held charge of the farm throughout the year.

Season.—The monsoon season started by the middle of June, which helped to a certain extent in taking up preliminary operations in the fields. Regular monsoon, however, began with the advent of the month of July when some rain was practically recorded every day. During the month of September nearly the same set of conditions prevailed. During October, heavy fall of about $4\frac{1}{2}$ inches was recorded on a single day. Rains did not stop even with the advent of the month of November during which it also appeared at regular intervals, thus bringing up the whole total fall, to about 12 inches more than the average towards the end of this month. This condition though not quite unfavourable for the growth of grasses told a good deal upon the healthy progress of the crops grown; seeds sown failed to germinate and show further progress on account of over-saturated condition of the soil and weeds grew in abundance. The crop of Jowar remained under stagnation of water for about a fortnight, the inevitable result of which was its failure as a crop. The season on the whole may well be said to be not favourable for the raising of Kharif crops.

Grass lands.—The crop of grass was good. Grasses grew in abundance though in patches all over the area. Since the grazing area has now been divided into separate blocks to be grazed in rotation, good grazing could be made available for the cattle for a period of about four months. Green grass to the extent of 216,550 lbs. was also obtained from this area open to grazing for the cattle, from portions that could not be thus grazed away by them. This was fed away green to the animals in the stalls. A certain area under the species *Ischaemum Laxum* appears to be doing well even under scanty or abundant rainfall and matures quickly. The area under this species of grass was reserved for silage-making to be harvested with mower and filled in pits. The total quantity thus obtained was 98,475 lbs. The second growth after this first harvest for silage was allowed to be grazed away by cattle.

Kalasgeri grass lands.—It has been a practice to allow grazing to some dry stock on this area from the month of November to the end of January. But as the farm supplied enough of grazing to such animals, the entire area was reserved for hay-making.

In this area, hay harvest clashes with the rice harvest. For economy sake hay harvest was, therefore, taken up on the 15th of December and finished by the 15th of January. The quantity of hay amounting to 63,000 lbs. at a total cost of Rs. 175 was obtained by working the mower on nearly half the area and on certain patches going thick with grasses.

Experimental varieties of grasses.—Guinea and Elephant grasses were sown on an area of 1 acre and 5 gunthas, without irrigation, the area being the portion reclaimed by filling in the mot that passes in front of the cattle byre. The stolons of these grasses were planted by the beginning of July and gave 14 cuttings amounting to a total of 20,099 lbs. of green grass.

The two varieties of grasses, viz. Gordura and Jaragway, supposed to be drought resistant varieties, were imported from Brazil as reported last year. The stolons of this grass were transplanted into a small plot last year. The grasses yielded 6,482 lbs. in three cuttings from an area of about 8 gunthas during the year. Nothing definite as yet can be said with regard to their drought resisting character.

Livestock.—During the year there were 36 coverings and 17 births (9 of male and 8 of female). The calves born during the year were full of vigour and life, weighing from 38 to 45 lbs. at birth. All these calves were the progeny of farm bred cows, their sires being either the farm bred bull or the bull purchased from the Mysore Province. From their general build and outward appearance it may be said now that there is a good deal of improvement with them, especially, with regard to uniformity of type.

There appears to be now a marked improvement of the herd as a whole in point of uniformity as measured from colour, conformation, make-up of the horns and cast of the face and forehead. This is much more the case with the female stock, where, it would be difficult for one to say which

is which. The bull calves are also impressive with bright reddish eyes fine cut of face and narrow muzzle. They all now show purity of blood.

Premium Bulls and Sale of Animals.—During the year under report, 11 bulls have been put out on Premium System against 3 the previous year. This has been found possible with the removal of the colour defect. The demand for farm bred bulls is increasing and possibly it may not be possible to cope with such a demand in course of time.

Diseases and Deaths.—It is very satisfactory to note that the farm remained free from all sorts of deadly diseases, though foot-and-mouth appeared as usual during the last week of March and one newly born calf succumbed to it. Casualties due to other causes than epidemics were six as against five of the previous year. 183 vaccinations against black-quarter and 108 against hæmorrhagic septicæmia were carried out as a preventive measure.

Silage.—During the year 315,414 lbs. of silage was made as against 610,374 lbs. the year previous. The following table gives the kind and quantity of each material used :—

				1931-32.	1932-33.
				lbs.	lbs.
Maize	..	..	..	150,208	126,053
Bajri	..	..	..	460,166	77,736
Jowar	..	..	..	....	13,150
Grass	..	..	..	....	98,475
Total				610,374	315,414

Maize silage made during the year was found to be quite excellent with practically very little of wastage. During the course of filling in operations, salt water was added to the stuff which has tended to minimise the wastage and give a particular liking to the cattle.

Fodder Crops.—The following crops were sown on the farm on an area of 38 acres and 22 gunthas.

Maize.—Maize was grown on an area of 9 acres and 20 gunthas with a seed rate of 40 lbs. per acre. Manure was applied at the rate of 10 cart-loads per acre. The total yield came to 133,253 lbs. giving an average of 14,026 lbs. per acre as against an average of 17,935 lbs. the year previous. All this stuff was put into the silo pit.

Local Jowar.—Hitherto Nandiyal variety of Jowar was grown on the farm as a fodder crop. It was found that fodder from this jowar though liked by the cattle in the green stage was not at all eaten by the cattle when dry. It was also seen that this does not make good silage. A change was, therefore, made from this year and the local variety of jowar was grown instead. An area of 6 acres and 20 gunthas under the crop yielded 36,650 lbs. of fodder and 800 lbs. of seed.

Bajri.—This is grown mainly with a view to turning the fodder therefrom into silage. From the experience obtained during the past with this crop, it was decided to cut it early and even before the crop has reached the flowering stage. The total green yield obtained from an

area of 3 acres and 6 gunthas from the crop was 77,736 lbs. which was turned into silage.

Kulthi.—The pulse crop was raised on an area of 11 acres and 6 gunthas as a secondary crop and allowed to seed. During the latter stage of growth of the crop, a species of insects attacked it, diminishing the outturn to a certain extent. The total yield came to 4,400 lbs. of seed and 18,500 lbs. of chaff.

Soya beans.—This is a new crop altogether grown on the farm during the year. The following varieties of Soya beans were tried :—

Mammoth Yellow,
Large Yellow,
Small Yellow,
Large Brown,
Small Brown and
Small Green.

Mammoth Yellow.—This variety was tried with different treatments on 2-guntha plot with a seed rate of 2 lbs. per plot. The following are the yields from all such plots :—

			Yield per plot.	
			Seeds.	Chaff.
			lbs.	lbs.
Treated with lime	..	..	1½	3
No lime	..	..	3	4½
Treated with ash	..	..	14	18
No ash	..	..	25	22
Treated with a mixture of lime and ash			20½	20

Large Yellow.—This was grown on a 20-guntha plot with a seed rate of 32 lbs. per acre. The plot was treated with lime only. It yielded 435 lbs. of seed and 433 lbs. chaff.

Small Yellow.—Tried on a 16-guntha plot with lime treatment and a seed rate of 40 lbs. per acre. The yield came on 420 lbs. seed and 280 lbs. chaff. The crop grew quite rank and the seeds obtained are double the size of the original ones sown into the plot.

Large Brown.—Sown on 18-guntha plot, treated with lime, with a seed rate of 36 lbs. to an acre. The crop grew quite well. The first growth from a portion of the plot was cut green and fed to stock. The crop was damaged a bit on account of rains while it was under harvest. However, the size of the final seeds was nearly one and a half times the original ones. The yield from the plot was 220 lbs. of seed and 370 lbs. of chaff.

Small Brown.—Grown on one-guntha plot with lime treatment with a seed rate of 40 lbs. per acre. It yielded 35 lbs. of seed and 31 lbs. of chaff.

Small Green.—Also tried on one-guntha plot with lime treatment and a seed rate of 40 lbs. per acre. It yielded 11 lbs. of seed and 19 lbs. of chaff.

Seeds from these harvests of Soya beans are being distributed to several parts of the Presidency.

Lucerne.—This was grown on an area of 7 gunthas under irrigation. It yielded a total of 11,155 lbs. in eleven cuttings during the year.

General.—A good deal of improvement in levelling the farm site has been carried out during the year. The farm has now become a centre of attraction for the cultivators.

Visitors.—During the year the farm was visited by the Collector, the Assistant Collectors and other Government District Officers. Director of Agriculture, Bombay Presidency, Poona, Deputy Director of Agriculture, S. D. Dharwar, Assistant to the Agricultural Engineer, Bombay Presidency, Poona, and the Professor of Agriculture with his staff and a batch of students from the Agricultural College, Poona, also paid visits to the farm.

CENTRAL POULTRY FARM, KIRKEE.

Personnel.—Mr. S. R. Zaidi held charge of the farm during the whole year.

General.—The farm had done even better than the year previous. The financial results are much better.

The farm is breeding the White Leghorn, the Australorp, the White Wyandotte and the Rhode Island Red. All these breeds of birds appear to be doing well in the Bombay Presidency.

Incubation.—This year's hatching results are nearly the same as those of the year previous. The March results, however, with Hearson's (Harris Patent, Hot Air) incubator are quite good in so far as the percentage of hatch of the fertile given by this machine is 82·8. The appendix IV gives the results of incubation with different makes of incubators for the various months of the hatching season.

Sale of hatching eggs, chickens and fowls.—During the year 299 eggs were sold together with 547 birds including chicks. The appendix V gives the details of the same.

Yield of flock birds.—Statement (appendix VI) shows how the different breeds and strains within breeds have performed during the year month by month and the average for the year. It may, however, be said in passing that the Wyandottes and the White Leghorn (Canadian and Dewar strain) have done the best with an annual average of 212·4 eggs each.

Statement (appendix VII) shows the disposal of eggs and used for hatching on the farm, sold for hatching and sold as table eggs with amounts realised.

Statement (appendix VIII) shows the strength of flock during the year. Statement (appendix IX) shows the livestock transaction during the year.

Financial position.—The total budget of the farm amounted to Rs. 2,297. Out of this a sum of Rs. 240 about was spent on petty construction charges and purchase of certain deadstock and birds. This left a balance of Rs. 2,057, which was utilised in meeting the demands of recurrent expenditure. The total realization amounted to Rs. 3,145-10-0; thus it will be seen that the receipts of the farm exceed the expenditure (even including that which was utilised towards certain permanent improvements etc.) by about Rs. 848.

Visitors.—This farm being located on the main Bombay-Poona Road, quite a number of people visit the farm for seeking advice in several matters.

Training facilities for poultry farming are given and two candidates availed themselves of this course.

THE BOMBAY GOW-RAKSHAK MANDALI, KANDIVLEE.

Kandivlee Gowshala.

(1) Government are keeping up their subsidy to this farm.

(2) The farm now consists of 84 cows, 36 bulls, 33 female stock and 4 breeding bulls at Kandivlee. At the Mandali's subsidiary farm at Betegaon they have 19 young bulls, 53 female stock other than cows and 3 breeding bulls.

During the year under report, a number of animals were purchased from Junagadh and four cows from Bombay. It has been desired to watch the performance of these animals with a view to eventually retain those only that come up to our requirements.

(3) During the year under report, death-rate among the stock has gone up a bit, on account of a great number of young calves born of newly purchased Junagadh cows contracting scour and subsequently dying of the same.

(4) The Mandali appear to be doing quite well now that it has got its subsidiary farm at Betegaon where dry stock and young growing stock can be maintained at a reduced cost. The Mandali are able to raise varieties of green fodder due to an abundant water supply made available by a very successful artesian bore and collected by a dam, pumped out by an oil engine and distributed to the field by a pipe line. This has cost them Rs. 11,600.

(5) The Mandali have given out four breeding bulls to gentlemen interested in the breeding of Gir cattle during the year.

(6) The Mandali held its annual cattle show at Betegaon in co-operation with several Taluka Development Associations and the Agricultural Department. The Thana District Agricultural and Cattle Show, as it was termed, was organised somewhat on the lines of the Presidency

Agricultural Shows held in the past by the Agricultural Department and was presided over by the Honourable Sir Ghulam Hussain Hidayatullah, Revenue and Finance Member to Government, and was a splendid success.

(7) The farms under the Mandali have been recognized as centres for training up post-graduate students in Animal Husbandry and Dairying and during the year under report one such student Mr. V. R. Kulkarni worked for some time and left the work for a job at Karachi with the Panjrapole. Mr. H. G. Patil has since been taken up to fill up the vacancy.

NUTRITIONAL PROBLEMS.

Northcote Cattle Farm, Chharodi.

The following nutritional problems are being tackled :—

(1) Experiment on commercial mineral licks is being continued to determine their effect on rate of growth of animals, early maturity, milk secretion, regularity in calving, resistance to diseases and various other activities.

It has been found that the commercial mineral lick used in the experiment were mostly made up of Sodium Chloride (88.9 per cent.) and looking to the other ingredients it contained it was thought advisable to work out our own formula for the same in collaboration with the Agricultural Chemist to the Government of Bombay. Taking T. B. Wood's as a basic one a new mixture suiting our requirements was worked out and a trial start was made.

(2) According to the local practice, animals in this part of the country are fed either with whole cotton seed or *guar* ground and soaked in water or boiled.

The ration of animals on the farm partly consists of *guar* ground and soaked in water. It seems probable that instead of giving *guar* in the ration of animals in either of the above forms, it would be better, if these grains are given after germination, for several reasons. Germinated grains, it is so thought, would be more palatable, wholesome and produce more desirable effect on the growth and the various physiological activities of the organism as a whole. The germinated grains, moreover, are very likely to make up for the deficiency in vitamin "C", if any, in the ration given to the animal, by reason of such grains containing the same in good amount. With a view, therefore, to test the utility of such grains in the ration of an animal, an experiment with work cattle has been undertaken at Chharodi.

(3) Work has been in progress with the collection of wild leguminous flora in pastures and testing them from several points of view. As many as 10 such species have been collected and identified by the Economic Botanist. The work of analysing the same, to judge their feeding values is in progress with the Agricultural Chemist. A few seeds of some of the promising varieties have been collected and attempts will be made to grow them under pasture conditions.

(4) Experiments with a view to improve the quality of pastures are in progress.

(5) Attempts are being made to grow varieties of Soya beans, which are known to possess proteins of high biological value.

Belegaon (District Thana).

(1) This place being now adequately supplied with perennial water, an experiment with a view to establish and improve permanent pasture of high livestock carrying capacity has been started.

(2) Work with the propagation of certain wild leguminous flora from seeds supplied from the Chharodi farm showed that these seeds failed to germinate under irrigation. Further work with this is in progress.

(3) It is desired to investigate the effects of malted foods versus non-malted foods on young growing animals. This kind of work, however, could not be taken up due to absence of either a platform balance or a weigh-bridge on the farm.

Kandivlee Gowshala.

With the appointment of a post-graduate student, work on nutrition will be taken up. For the present, to improve the monsoon grown pasture for hay is on hand. In addition to this the best means to improve the quality of silage and minimise the losses due to surface and side deterioration are being studied.

Central Poultry Farm, Kirkee.

(1) An experiment to find out the comparative feeding value of locust meal versus fish meal is in progress.

(2) Other experiments with various other foodstuffs are under contemplation, time and economic conditions permitting.

Cattle Breeding Farm, Bankapur.

The following problems are desired to be tackled for the present:—

(1) Evolving the best means to improve the quality of silage and minimise the losses due to the surface and side deterioration thereof.

(2) Effect of germinated grains versus dry grains on young growing animals.

(3) Effect of improved complete mineral mixture versus mineral mixture obtained in the market.

Work in the District.

(1) Effect of complete mineral mixture in disease resistance.

(2) Observations on spontaneously growing leguminous flora and the collection of their seeds are under contemplation.

Work at the Headquarters, Poona.

A study of mineral contents of herbage at various tracts in the Presidency and their influence on the health stamina, and physiological activities of livestock is being taken up. The work of introduction, acclimatisation and propagation of fodder plants of special merits is also to receive special attention.

APPENDIX I.

Statement showing details of Premium bulls issued during the year.

Serial No.	Name of village.	Taluka.	District.	Name of Agent.	Date of Issue.	Remarks.
1	Fangdi ..	Sanand ..	Ahmedabad.	Dhula Raja Bharwad	27th May 1932.	
2	Kaher ..	Bardoli ..	Surat ..	Rustamji Kavasji Kasad.	23rd June 1932.	
3	Sachana ..	Virangam..	Ahmedabad.	Malu Narayan Bharwad.	21st July 1932.	
4	Khoda ..	Sanand ..	Do. ..	Jutha Rewa Bharwad.	2nd September 1932.	
5	Dhamatvan.	S. Daskroi	Do. ..	Bechar Ranchhod Rabari.	19th September 1932.	
6	Vanch ..	Do. ..	Do. ..	Mahiji Kalyan Rabari.	26th September 1932.	
7	Bol ..	Sanand ..	Do. ..	Lakha Bhala Bharwad.	Do.	
8	Khodiar ..	N. Daskroi.	Do. ..	Bansilal Jivnarai Desai.	9th November 1932.	
9	Godhavi ..	Sanand ..	Do. ..	Shibhai Mashru Rabari.	12th November 1932.	
10	Ankleshwar.	Ankleshwar.	Broach ..	Principal, Vocational Training School.	13th December 1932.	
11	Goraj ..	Sanand ..	Ahmedabad.	Jesing Viha Bharwad.	29th December 1932.	
12	Kalana ..	Do. ..	Do. ..	Virma Ruda Bharwad.	9th February 1933.	
13	Varad ..	Bardoli ..	Surat ..	Prembhai Parbhubhai.	27th November 1932.	
14	Malekpore..	Do. ..	Do. ..	Malek Mustafa Musabhai.	28th November 1932.	Issued through the agency of Surat Farm authorities in "B" Zone.
15	Puni ..	Do. ..	Do. ..	Gulabbhai Bhimbhai.	Do. ..	
16	Kuvadla ..	Do. ..	Do. ..	Vanmali Jivan ..	2nd December 1932.	
17	Bajipura ..	Do. ..	Do. ..	Rustamji Dorabji ..	25th February 1933.	

APPENDIX II.
Statement of Milk Production month by month.

Month.	1930-31.			1931-32.			1932-33.		
	Milk yield lbs.	Number of cows milked.	Average per cow.	Milk yield lbs.	Number of cows milked.	Average per cow.	Milk yield lbs.	Number of cows milked.	Average per cow.
April	9,003	29	313.5	8,935	29	308.1	8,540½	30½	279.9
May	9,513	33	288.2	11,067	38½	303.1	8,961½	34½	257.9
June	9,177	37	275	11,995	42½	282	9,605½	39	246.8
July	13,384	40	334.6	13,767	44½	310	12,742	42	303.4
August	12,579	38	331	16,738	43½	384.7	14,463½	42½	342.2
September	11,467	35	327.6	13,357	40	333.9	13,124	42½	310.5
October	9,589	33	290.5	11,941	35	341	11,205	39½	283.5
November	7,813	32	244.1	9,068	30	302.4	8,732	33½	260.7
December	8,415	34	247.5	8,199	25½	321.4	9,603½	34½	278.0
January	9,329	35	266.5	8,947	26	339.7	9,438	36½	260.4
February	9,260	32	289.3	8,191½	23	292.6	8,959	36½	243.2
March	7,708½	26	296.5	8,942½	30½	292.3	12,100½	40½	298.8
Total	117,327½			131,648			127,475		

APPENDIX III.

Statement showing progress in yielding capacity of the Kankrej herd at the Chharodi Farm during a period of 12 years.

Serial No.	Year.	Average number of cows during the year.	Number of individual cows in the Cow Herd.	Number of cows milked.	Percentage of cows milked to the total number of cows.	Number of cows yielding 1,500 lbs. and above.	Percentage of cows to the total number of cows.	Annual average yield per cow milked.	Remarks.
1	1921-22	231	....	100	43	6	2.6	Lbs. ozs. 438 11	
2	1922-23	158	....	69	44	4	2.6	637 11	
3	1923-24	194	....	67	35	13	6.7	827 7	
4	1924-25	204	....	109	53	16	7.8	932 11	
5	1925-26	173	....	93	54	32	18.5	1,330 14	
6	1926-27	181	....	109	60	28	15.4	1,074 1	
7	1927-28	128	....	90	70	33	25.6	1,400 0	
8	1928-29	100	....	94	94	31	31	1,456 0	
9	1929-30	88	....	74	84	41	46.6	2,044 8	
10	1930-31	78	....	66	85	43	55.1	1,879 8	
11	1931-32	75	....	64	85	42	56	2,179 10	
12	1932-33	....	83	78	94	40	48	2,152 9	

APPENDIX IV.

Statement showing the Incubation Results at the Central Poultry Farm, Kirkee.

Serial No.	Month.	Kind of Incubator.	Total charge.	Percentage of Infertiles.	Percentage of Hatch of the total charge.	Percentage of Hatch of the Fertiles.	Remarks.
1	November 1932	Hearson's (Small and Big) and Phipps.	535	37.4	20.4	32.5	50 Eggs used for demonstration at Agricultural Show, Pandharpur. The hens were in moult, and hence a large per cent. infertiles.
2	December 1932	Hearson's (Small and Big) and Phipps.	359	27.9	40.4	50.0	
3	January 1933	Hearson's (Small and Big) and Harris Patent "Hot Air".	613	24.4	39.2	51.8	87 Eggs used for Buckeye Incubator trial.
4	February 1933	Do.	485	30.9	34.0	40.3	
5	March 1933	Do.	219	22.8	18.3	82.8	

APPENDIX V.

Statement showing stock of birds, chicks and settings of eggs supplied to Government Stations and Out-Stations.

Government Station.	Number of setting eggs.	Number of birds or chicks	Out-Station.	Number of setting eggs.	Number of birds or chicks.	Remarks.
District Agricultural Overseer, North Thana, Palghar.	..	24	Khanapur ..	15	..	
Head Master, Agricultural School, Dhulla.	..	10	Poona and Kirkee ..	239	102	
Inspector of Agricultural Schools, Dhulla.	..	2	Bombay ..	30	4	
Agricultural Overseer, Kopergaon.	..	2	Ahmedabad ..	..	16	
District Agricultural Overseer, Sangamner.	45	..	Ahmednagar ..	..	21	
Agricultural Overseer, Malegaon.	30	..	Bangalore ..	..	23	
Taluka Development Association, Chalisgaon.	30	1	Satara ..	..	290	
Taluka Development Association, Bhusawal.	..	2	Khar ..	..	1	
District Local Board, Satara ..	..	56	Thana ..	..	4	
			Nasik ..	..	19	
			Mahwa ..	..	20	
			Bhavnagar ..	..	2	
			Dharwar ..	15	5	
			Broach ..	..	2	
			Goa ..	..	4	
			Ujjain ..	..	1	
			Dhond ..	..	12	
			Kolhapur ..	..	4	
			Bandra ..	..	4	
			Hyderabad (Deccan) ..	..	6	
			Hyderabad (Sindh) ..	..	7	
Total ..	105	97	Total ..	299	547	

APPENDIX VI.

Statement showing average yield of eggs of different breeds at the Central Poultry, Farm, Kirkee.

Breed and Strain.	Average number of birds laying per month.	Yield.											Average yield per month.	Average yield per bird per annum.
		April 32.	May 32.	June 32.	July 32.	August 32.	September 32.	October 32.	November 32.	December 32.	January 33.	February 33.	March 33.	
Wyandotte ..	12.4	105	127	116	119	188	243	325	277	345	365	257	197	212.4
Rhode Island Red ..	20.6	228	207	293	276	277	267	324	325	370	480	412	427	140.4
Australorp ..	5.6	20	22	55	69	87	76	42	39	26	49	21	38	108.2
White Leghorn (Prince of Wales).	12.6	180	170	250	227	143	189	106	100	101	131	146	160	144.0
White Leghorn (Canadian and Dewar).	2.4	66	60	80	52	47	48	31	16	15	18	16	20	212.4
White Leghorn (Goodwin Freece).	17.9	120	150	189	220	233	264	214	286	360	472	554	570	204.0

APPENDIX VII.
Statement showing the Transaction of eggs during the year at the Central Poultry Farm, Kırkee.

Month.	Number Broken, Fed, etc.	Table eggs.		Setting eggs.		Sale of eggs on adjustment.		Miscellaneous sale.	Remarks.
		Number.	Amount.	Number.	Amount.	Number.	Amount.		
April 1932	..	5	Rs. a. p. 60 0 0	..	Rs. a. p.	..	Rs. a. p.	Rs. a. p. ..	
May 1932	..	2	744 62 0 0	..	....	..	....	..	
June 1932	..	4	954 79 8 0	..	....	..	....	..	
July 1932	..	4	981 81 12 0	..	....	..	....	..	
August 1932	..	2	951 79 4 0	..	....	..	....	5 0 0	
September 1932	..	1	1,029 85 12 0	..	....	..	....	..	
October 1932	..	1	774 64 8 0	..	....	..	....	..	
November 1932	..	1	513 42 12 0	146	113 0 0	..	....	..	
December 1932	..	6	675 56 4 0	75	60 0 0	..	....	..	
January 1933	..	22	789 65 12 0	63	48 0 0	30	18 0 0	..	
February 1933	..	84	813 51 12 0	81	57 0 0	..	....	..	
March 1933	..	60	1,287 86 6 0	9	9 0 0	..	....	..	
Total	..	201	10,284 821 10 0	374	287 0 0	30	18 0 0	5 0 0	

APPENDIX VIII.

Statement showing the strength of flock during year at the Central Poultry Farm, Kirkee.

Serial No.	Breed (Adults).	Sex.		Total.	Breed (Under year).	Sex.		Total.	Serial No.	Chickens.	Total.	Grand total of flock.
		Cocks.	Hens.			Cockereels.	Pullets.					
1	W. Leghorn	3	35	38	W. Leghorn	32	27	59	1	W. Leghorn	61	412
2	Australorp	2	4	6	Australorp	5	5	10	2	Australorp	31	
3	R. Red	2	20	28	R. I. Red	25	18	43	3	R. I. Red	07	209
4	Wyandotte	1	11	12	Wyandotte	5	2	7	4	Wyandotte	20	
	Total	8	70	84		67	52	119			209	

APPENDIX IX.
Statement showing the Live-stock transaction during the year at the Central Poultry Farm, Aizawl.

Month.	Number hatched.	Died and destroyed.		Sold.			Purchased.	Remarks.
		Adults.	Chicks.	Adults.	Amount realised.	Chicks.		
April 1932	..	1	21	..	Rs. a. p.	..		
May 1932	..	4	5	..	.....	..		
June 1932	..	3	10	71	335 0 0	2	1 8 0	
July 1932	..	2	8	103	651 0 0	..	.....	1 Wyandotte cock*.
August 1932	..	9	..	17	146 0 0	..	.....	*Purchased from Capt. S. R. Carrol, Deoli, Rajputana.
September 1932	..	2	..	17	124 0 0	..	.....	
October 1932	..	3	..	5	40 0 0	..	.....	
November 1932	109	3	5	7	55 0 0	..	.....	
December 1932	145	4	3	7	70 0 0	98	113 0 0	
January 1933	240	..	14	7	64 0 0	102	102 -0 0	
February 1933	165	1	12	6	47 0 0	135	140 0 0	
March 1933	140	3	16	3	21 0 0	64	104 8 0	
Total	799	35	94	243	1,553 0 0	401	461 0 0	

* Purchased from
 S. R. Carrol,
 Rajputana.
 1 Wyandotte
 cock*.

*Programme of work under the Live Stock Expert to Government,
Poona, for the year 1933-34.*

I. *Breeding Farms.*—The policy of breeding up reliable pure strain of cattle will continue, keeping in mind the production of a more economical animal, which will mature early and calve more regularly. The breeding of a good dual and draught purpose animal on the above lines will continue at Chharodi and Bankapur respectively.

II (a) Investigations and experiments will be conducted on the various food-stuffs as far as finances will permit.

(b) The cost of raising "B" class bulls purchased in "A" Zone will continue.

III (a) Propaganda in connection with the spreading of the use and benefits of pedigree bulls will continue together with teaching of better methods of care.

(b) The Herd Register introduced the year before last will continue, the idea being to number in one year and the initials of the village in the other of all the pure cattle of each breed. Thus in a few years we shall have all the purer types of cattle pedigreed, as we shall know the dams and sires. Moreover, we shall be able to trace progeny of Premium bulls. This method will be advantageous to breeders, as they can with the Certificate supplied prove their animals to be well bred.

IV. The co-operation with the Kandivlee Gowrakshak Mandali will continue in breeding, raising and spreading in towns the Gir breed, which is very useful for this purpose, together with the fine illustration of what can be done if the people are so inclined with Pinjrapoles to make them useful institutions to the country instead of the burden they are at present.

V. The laying out of permanent irrigated pastures at Betagaon and to work out the economic value of same.

VI. The co-operation with the Sangli Industrial and Agricultural School, Sangli, in improving goats on a small scale will continue.

VII. Further extension in making popular the use of silage.

VIII. Experiments in growing fodder crops on farms will continue.

IX. *Poultry.*—(a) The work of breeding suitable foreign breeds of poultry will continue on the Government Central Poultry Farm, Kirkee.

(b) Investigations regarding inoculation, control of diseases and feeding of poultry.

(c) To help and advise poultry breeders as far as it is possible.

(d) Experiments in the egg laying capacity of different breeds in single testing pens will continue.

X. *Sheep*.—The Sheep breeding scheme passed by the Provincial Agricultural Research Committee on 15th June 1932 and submitted to the Imperial Council of Agricultural Research, Simla, was considered by the Advisory Council of the Imperial Agricultural Research Committee at their sitting held on 16th February 1933 when the Director of Agriculture and the Live Stock Expert attended the meeting. The scheme was still to be considered before it was allowed to start.

H. G. BALUCH,

Acting Live Stock Expert to Government,
Bombay Presidency, Poona.

APPENDIX N.

SUMMARY OF WORK DONE UNDER THE ASSISTANT TO THE AGRICULTURAL
ENGINEER TO GOVERNMENT, BOMBAY PRESIDENCY, POONA,
FOR THE YEAR 1932-33.

During the year under report Mr. C. G. Paranjpe held charge of the Agricultural Engineering Section.

The only change in the establishment was the reduction of the post of the Boring Overseer, from March 1933, due to the closing down of the activities in boring.

Advice.

The number of inquiries for advice in agricultural engineering amounts to 62 out of which 7 are for tractor ploughing, 5 for pumping, 13 for boring, 1 for threshing, 5 for oil engines, 12 for oil engine class and 19 for miscellaneous subjects. Only 9 cultivator students were trained at the oil engine class attached to the workshops.

Special Works.

Considerable time and attention had to be given to the following works which were specially entrusted to this Section for estimates, design and execution.

I.—Works carried out at the Sugarcane Research Station, Padegaon, District Satara.

- (1) Erection of a pumping plant on the river Nira for water supply, comprising a 6 BHP Hornsby engine, a 2" plunger pump, about 4,000' of piping to the various centres and connections.
- (2) Erection of a steel tower with tank and pipe connections for the laboratory.
- (3) Erection of a gas-plant with shed and connections.
- (4) Steel machinery shed 40' × 40' with an engine house of 20' × 20'.
- (5) Steel *gurhal* house, 116' × 24'.
- (6) Steel pot-culture house 50' × 25' × 15', complete with trolley line and enclosure.
- (7) Wire fencing all over the area together with 3 steel big gates and 4 small wickets.
- (8) Erection of the following machinery :—
 - 32 BHP Blackstone spring injection type crude oil engine complete with connections.
 - Two Chattanooga sugarcane mills Nos. 192 and 145 complete with feeders, bagasse carriers, juice tanks and strainers.
 - Two juice pumps with connections.
 - One 3" under-ground countershaft with ball bearing pedestals and belt trenches.

One 2" rotary water pump for engine cooling.

Three-ton Avery cart weight-bridge.

- (9) 36" Hume half-round water trough for cattle and 24" half-round Hume pipe mangers 80' in length in the cattle shed.
- (10) Reinforced cement concrete storage tank to hold 3,000 gallons of water at the farm complete with pipes and connections to the various centres.
- (11) 10" reinforced cement concrete Hume pipe line 761'-9" in length with a receiving tank 4' $\times$ 4' $\times$ 5' and 8 intermediate tanks 3' $\times$ 3' $\times$ 4' all of reinforced cement concrete fitted with strainers, flap valves, regulating valves, covers and over-flow and 4" meter connections.
- (12) 6" reinforced cement concrete hume piping in aggregate length of 2838' for the 2 year's water measurement plots complete with 78 reinforced concrete sinks each 2' $\times$ 2' $\times$ 3' in dimensions and fitted with two 4" flanged outlets and one 6" C.I. flap valve for shutting off or opening water instantaneously.
- (13) Two 4" Leeds rotary meters with connections.

II. Works carried out at the Wheat Breeding Station, Niphad, Nasik District.

- (1) Erection of a pumping plant on the river Kadwa comprising a 12 BHP Blackstone kerosine engine and a 2½" "American" centrifugal pump complete with 600 feet of piping including both suction and delivery and a 4' cube galvanised iron discharge tank with masonry foundation block and connections.
- (2) Erection of a suitable steel house 21' $\times$ 10' for the above engine and pump including belt and pipe trenches and steps to reach the pump.
- (3) Fencing for the above plant with a suitable steel gate.
- (4) A steel store shed 30' $\times$ 15' $\times$ 9' complete with Shahabad stone paving.
- (5) A 4" bore hole 90' deep complete with a bore-hole hand pump. The pumping plant is intended to give a discharge of 150 to 200 gallons of water per minute at the discharge tank and the bore-hole pump gives out 150 to 160 gallons of water per hour.

III. Shed for soil temperature tanks.

A steel shed for housing 5 soil temperature tanks was designed and built for the Plant Pathologist at the Poona College of Agriculture measuring 16' $\times$ 10' $\times$ 9½'. It is fitted with two reinforced concrete tables for mixing purposes and a big reinforced concrete base for carrying the 5 soil tanks in a row. The sides of the shed are closed with expanded metal and the top is covered with glass. A woven-wire fencing is also provided with a suitable gate in the front.

It may be noted here that most of the steel work in connection with the above works was done by the Departmental men partly at site and partly at the shops at Poona with a view to effect economy.

Research on Implements.

The Implements taken up for research are as under :—

- The Seed Drill,
- The Winnowing,
- The Groundnut Digger,
- The Ring-Making Machine, and
- The Lime Juice Extractor,

and a brief account of each of the above is given below in the same order.

Seed Drill.—As decided in the last year's Crop Research Committee the Schutte Patent Drill was given an endurance test at Nargund in Dharwar District along with a local drill with two objects in view, viz. (1) to see if the draft required by the machine is beyond the capacity of an average pair of bullocks and (2) to see whether an average pair of bullocks can stand a draft equal to $1/10$ of their combined weight for a fairly long period. About 28 acres were sown with the drill with cotton and the trials showed that the drill with 2 coulters required a draft of 120 to 125 lbs. and that the pair used (which weighed about 1,200 lbs.) could stand it for a fairly long time without much exhaustion. Thus although the draft was not beyond the capacity of an average pair of bullocks still it was nearly double that of the local drill and consequently the ryots appeared to be rather reluctant to use it especially when they found the machine somewhat complicated, and difficult to work on slightly wet or undulated lands.

There was no scope for improving the drill any further or reduce its weight. A new model on entirely new lines had therefore, to be devised and built, incorporating therein all the good features of the Schutte Patent Drill, such as the seed box and the distributing arrangement. The trials taken with it at the Dharwar and Mohol Farms give out very encouraging results.

The draft is found to be very much the same as that of the local drill. The weight has been brought down to 200 lbs. by introducing a round hollow beam and fixing the usual wooden coulters to it by suitable turned clamps bolted to the same. The lifting arrangement is taken in the front under the pole and the power to work the seed box is taken from the shaft of these wheels, thus doing away with the main wheels. The round beam admits of the coulters being fixed at any angle and a small spring adjustment to the lifting handle regulates the depth to a small degree without any special efforts. A telescopic pole is provided, which admits of any size of bullocks without disturbing the angle of the coulters. The lifting and sowing arrangements are divided into two units with a view to attach either of them on to a local drill. The new drill is being given exhaustive trials this season and it will be possible to give some figures as regards its working in the next year's report.

Winnower.—The improved winnower was tried again this year at Dharwar and in Khandesh on wheat in comparison to local method and it was found that the cost of winnowing with the local method comes to Rs. 0-12-9 per 1,000 lbs. while that with the machine to Rs. 0-10-3 only. The local method of winnowing by wind is certainly the cheapest and the most efficient if there is a continuous and sufficiently strong wind blowing during the threshing time. But as it seldom occurs, they have to wait for a long time and hence there is a need for a machine. With a strong and favourable wind the local method will cost only 6 to 7 annas per 1,000 lbs. The machine can, however, separate the grain from *bhusa* and grade it through suitable sieves, but its cost which is over Rs. 150 has been found to be beyond the means of an average farmer and consequently it has been decided in the last Crop Research Committee that there is no real case for a machine at such a high price. The Committee has, however, recommended the introduction of a fan for separating the *bhusa* from the grain and efforts in that direction are in progress.

Groundnut Digger.—As stated in the last year's report a lighter digger has been designed and built at the shops on the principle of Howard's Rotary Digger and sent to Chikodi again for a trial. Howard's digger was found to require an excessive draft on heavy soils while the Guntaka harrow, which was also tried at Chikodi, was found to be too light for the purpose. The lighter digger referred to above is practically a combination of the Howard digger and the Guntaka implement and it weighs only 400 lbs. which is nearly half the weight of the Howard Digger. The draft required is yet over 250 lbs. and consequently it requires further modifications and tests. The cost of the Howard Digger is Rs. 360 while that of the light digger is likely to be about Rs. 300. The Crop Research Committee, however, considered this cost to be very excessive when compared with the purchasing capacity of the ryots and recommended the modification of the implements at present in use in the United Provinces and Gujarat in digging out groundnuts and efforts are being made in that direction.

Ring-Making Machine.—There was a great need of a machine for making rings 5/16" in diameter out of a 22° gauge M.S. wire for use of the Cotton Breeders in Gujarat, Khandesh and the Karnatak who require them in thousands every year. An attempt was first made to buy a ready-made machine but as it proved a failure, the design of a suitable machine was put in hand. There are two distinct operations in making rings. The first is to coil the wire at the required diameter and the second is to cut it at each coil. A combined operation presented a difficulty in keeping the coils tight until the entire length is cut. Consequently the coiling is done separately on a worm screw gear at a speed of 425 revolutions per minute and the cutting is done later by striking a knob holding a chisel-pointed cutter. The whole out-fit will cost Rs. 30 approximately and it will turn out 140 to 150 rings per minute when worked by hand. The cost of the rings will chiefly depend upon the skill of the operator but it can safely be taken at two to three annas per 1,000 rings including the cost of the wire.

Lime Juice Extractor.—At the request of the Horticulturist to Government and under instructions from the Honourable Minister of Agriculture to design a lime juice extracting machine which will be simple and cheap, efforts were made to evolve a machine which will meet the conditions. A mere press without cutting the lemons was found to absorb enormous power. It was, therefore, found essential either to cut the lemon before pressing or perforate the outer skin in order to make pressing easy. Cutting the lemon presented certain difficulties and hence the idea had to be given up. Perforating the skin is accomplished by fixing suitable steel pointed pins on to the bottom of a plunger which is worked in a wooden die with great pressure with the help of a multiple screw. The wooden die is provided with a suitable perforated bottom plate to receive the ends of the pins while pressing and squeezing the juice out. The top of the screw is fitted with a hand wheel. One man can easily turn the wheel and work the plunger up and down and press about 300 to 350 lemons per hour. The extraction of juice is 56 per cent. The seeds slip out of the bottom perforated plate without being squeezed or crushed in the operation. The lowering of the plunger for pressing and raising it for emptying take more than a minute and a half and with a view to save some time a double screw machine with two plungers and two dies has been built with a chain gearing. This no doubt is found to save time but the degree of pressure to the screw, which has to be given through the medium of a chain gear, instead of direct, as in the case of a single screw machine, was found to be rather difficult to get. The size of the plunger and dies was then reduced and although it relieved the pressure considerably, a single-screw machine appears to be more simpler and effective.

With a view to increase the output and run the machine by a belt, a rotary machine has been also devised. It is provided with a set of steel rotary knives at the feeding mouth to catch the lemon and slice it and a set of wooden rollers for extraction of juice. The percentage of extraction with this machine is found to be only 40 per cent., as the pressed stuff and the juice extracted, cannot be efficiently separated from each other. If the pressed stuff when accumulated is passed through a small lever press, the loss in extraction of juice can be easily recovered. The machine is still in an experimental stage and requires further improvements.

The work on hand as regards the research on implements is confined to the following machines.

- (1) Telescopic spraying arrangement for spraying betelnut bunches to a height of 40' to 50' above ground.
- (2) Bullock-power tine cultivator for Gujarat.
- (3) Bullock power harrow for the Soil Physicist.
- (4) Further modifications on the new seed drill.
- (5) Manufacture of three more ring-making machines.
- (6) Further modifications in the lime juice extractors.
- (7) Design of a dust gun.

- (8) Bullock-power wheat thresher.
- (9) Design of a clod crusher.
- (10) Design of a simple fan for work at the threshing yard for separating *bhusa* from grain.

Repairs to Machinery.

The following is a brief summary of the most important works undertaken by the Department in connection with repairs to machines during the year under report. This partly includes the work done at the shops although it is very difficult to give in such a small space all the works carried out at the shops during the last 12 months.

- (1) Repairs to the 15.5 BHP Blackstone kerosene engine and the 5 roller "Cuba" sugarcane mill at the Arbhavi Farm.
- (2) Repairs to the pumping plant on the septic tank at the Poona College of Agriculture.
- (3) Repairs to the air pump from the College Chemical laboratory.
- (4) Repairs to the lawn mower clipper received from Dharwar Farm.
- (5) Repairs to Musto boring machine No. 19.
- (6) Renewal of the two elevated tanks on the tower close to the experimental well at Poona together with repairs to the steel tower and renewal of the down take pipe connections.
- (7) Overhauling the Model L Case tractor.
- (8) Repairs to the pasteuriser from the College Dairy.
- (9) Testing of two pumps for two new Famine Sets.
- (10) Trial of the old pumping plant at the Ganeshkhind Gardens, Kirkee, and small repairs to the new engine.
- (11) Dismantling the pump and pipes at the Koran Farm and removing them to Poona.
- (12) Erection of two new sheds at the shops one for housing the machinery received from Manjri Farm and the other for housing the smith's shop which is now shifted from the famine shed and providing fencing for two enclosures.

Hire of Plants and Sale of Machines.

The total departmental receipts during the year under report amount to Rs. 34,758-3-4, as specified below.

Rs.	a.	p.	
30,617	4	4	Sale of 8 boring machines.
695	1	0	Hire of a boring machine.
50	0	0	Sale of boring stores.
291	8	7	Hire of pumping plants.
1,800	0	0	Sale of 30 BHP engine from the Sir Sassoon David Trust Fund.
1,213	7	2	Sale of implements and stores.
39	0	3	Repairs executed.
51	14	0	Miscellaneous receipts.

34,758 3 4

Drawings, Designs and Estimates.

The drawing office has turned out 63 drawings and made several boards for the Show at Pandharpur. The sites surveyed both for famine and private individuals amount to 7 but no schedule is attached to this report as regards the approved famine pumping sites on rivers as none was found to be suitable. The number of estimates submitted amount to 19 out of which 4 are for rice hulling plants, 4 for pumping plants and 11 for construction works undertaken at Niphad and Padegaon.

Miscellaneous.

The staff has done fairly well in the discharge of their duties, otherwise it was not possible to attend to the several important works enumerated in this report. The undersigned would, however, like to keep on record his sense of appreciation of the very valuable services rendered by the Boring Overseer, Mr. Chitale to the Department during his tenure of service.

C. G. PARANJPE,

Assistant to Agricultural Engineer,
to Government, B. P., Poona.

Programme of work under the Assistant to Agricultural Engineer to Government, Bombay Presidency, Poona, for the year 1933-34.

- | | |
|---|--|
| (1) Research on implements including modifications and tests. | <ul style="list-style-type: none"> (a) Modifications and tests with the new seed drill, the Norag Thresher, Lime Juica Extractors, Bullock Tyne Cultivator, Telescopic spraying arrangement for betelnut bunches. (b) Design and manufacture of a bullock power harrow, a clod crusher, dust gun, ring making machine, blowing fan for separating bhussa from grain. (c) Experiments with water lifts and other agricultural machinery. |
| (2) Famine pumping | <ul style="list-style-type: none"> (a) Inspection of pumping sites on large rivers in the Presidency for growing fodder. |
| (3) Advice and practical help. | <ul style="list-style-type: none"> (a) Training of cultivator students in engine driving. (b) Periodical inspection of agricultural machines. (c) Advice to inquirers on agricultural machines. (d) Advice to the Divisional Officers in machinery. (e) Estimates, drawings, designs and surveys. |
| (4) Higher technical assistance. | <ul style="list-style-type: none"> (a) Resource to Divisional Officers in case of breakdowns and repairs. (b) Erection of big plants and structures. |
| (5) Special works | <ul style="list-style-type: none"> (a) The Cold Storage Plant at the Ganeshkhind Botanical Gardens, Kirkee. (b) The several buildings and constructions in connection with the new dry farming scheme at Sholapur and Bijapur. (c) The water measuring arrangement through 6" Hume pipes and sinks with the help of a meter at Padegaon, for the 3rd year. |

- | | |
|--------------------------------|---|
| (6) Running of plants like the | (a) Workshops and Experimental Well. |
| | (b) Motor tractor for private individuals. |
| (7) Sale and hire of machines. | (a) Hire of boring machines. |
| | (b) Sale of Boring Machines and Stores. |
| | (c) Hire of pumping plants. |
| (8) General | (a) Routine work pertaining to Office, Workshops and Experimental Well and Divisions. |
| | (b) Charge of Nangaon Plant, Karajgi Plant, Steam Plough and all the boring stock at the three centres. |

C. G. PARANJPE,

Assistant to Agricultural Engineer,
to Government, B. P., Poona.

APPENDIX O.

SUMMARY OF WORK DONE UNDER THE HORTICULTURIST
TO GOVERNMENT, BOMBAY PRESIDENCY, POONA,
FOR THE YEAR 1932-33.

Staff.—Mr. S. R. Gandhi, M.Ag., demonstrator in horticulture proceeded on study leave to England and Mr. I. A. Sayed is working in his place. Mr. N. G. Masur, took charge of the vegetable breeding work under the Sir Sassoon David Trust Fund from Mr. Sayed. Mr. S. M. Patel, graduate assistant working in the Ganeshkhind Botanical Gardens, Kirkee, is transferred to Niphad, and Mr. B. A. Nazareth is substituted in his place.

As a retrenchment measure, two posts of non-graduate assistants were retrenched this year and considerable reduction is made in the budget grants of the gardens also. An effort is being made to run Modibag as a commercial farm.

Laboratory Work.—The preservation of lime juice is yet under investigation. A scheme relating to the investigations connected with the successful bottling of lime juice was accepted by the Provincial Council of Agricultural Research and submitted to the Imperial Council of Agricultural Research for consideration and acceptance. It may be of some interest to mention here that the Oriental Fruit Preservatory, Kirkee, Poona 3, have successfully adopted most of our methods and have put a really good juice on the market for sale. It is anticipated that the manufacture of lime juice will develop into a cottage industry if the work is wisely handled.

Investigations on jambul juice, jams, and other preserves are also being made side by side with lime juice.

Horticultural Teaching.—Optional and other horticultural classes were popular as usual. There were 20 students in the College for Advanced Horticulture. The practical horticultural course in the Ganeshkhind Botanical Gardens attracted 9 students during the year under report. Besides, candidates from Wankaner State in Kathiawar, the United Provinces and Surat District were admitted for special training in Horticulture.

Examination Results.—Out of the 20 students who appeared for the University Examination in B.Ag., with Advanced Horticulture as their optional subject, 18 got through.

Publications.—During the year under report, the following Bulletins were published :—

- (1) "THE MARKETING OF FRUITS AND VEGETABLES IN BOMBAY", by Dr. G. S. Cheema, D.Sc.; the Horticulturist to Government of Bombay, Poona.
- (2) "REPORT ON THE EXPORT OF MANGO TO EUROPE IN 1932", by Dr. G. S. Cheema and P. G. Dani, B.Ag., B.Sc.

The Export of Mangoes to Europe.—This work was undertaken in hand chiefly to confirm the results of the previous year. A grant of Rs. 5,100 was placed at the disposal of the Horticulturist to Government by the Imperial Council of Agricultural Research, New Delhi. All the information in connection with this work from the other end is not available at the time of writing this Report. Hence it is not possible to make any definite statement just at present. A good deal of fruit however, was sent to England through private agencies.

Extension of Cashewnut cultivation.—A scheme dealing with the investigation of Cashewnut cultivation was submitted to the Government. The Government have, now, instituted further enquiries in the matter and have asked for a joint report from the Department of Agriculture and the Department of Industries. It is not, therefore, possible at this stage to make further remarks on this subject.

Marketing Studies.—A great deal of interest is being taken by the public in this work. It is expected that the Market situation will be thoroughly studied by an Expert Committee appointed by the Government of Bombay, *vide* G. R., R. D., No. 8784/28 of 28th June 1933. The Government have also under consideration the question of convening a market conference to discuss the various important aspects of the marketing of fruits and vegetables in this Presidency.

GANESHKHIND BOTANICAL GARDENS, KIRKEE.

It is gratifying to note that the retrenchment policy has not much interfered with the remodelling of this Farm. However, it has lost one non-graduate assistant from the establishment.

Remodelling Work.—This work is progressing satisfactorily. More area has been levelled and brought under fruit cultivation. It is expected that the whole garden will be brought under regular cultivation in the course of a few years if sufficient funds are made available.

Mango.—The mango manurial trials as laid out in the previous year are being followed.

Jambul.—A few grafted jambul trees have borne fruits for the first time. The fruit is within easy reach. The size of the fruit is not so big as it was expected to be. Further progress of these trees will be watched in future years.

Guava.—All the selected strains are growing properly and bearing fruits. The quality of the fruit is good. Comparative tests will be made.

Pomegranates.—Some of the selected strains with soft seeds are bearing fruit. The fruit is of good quality. The comparative value of these strains will be worked out in due course.

Bananas.—The seedling bananas are not giving better fruit than the existing choice varieties. Basrai banana suckers were distributed in large quantities and the demand for it is great. Arrangement is made to supply the required quantity.

Grape vines.—The plantation of Bhokari vines is growing satisfactorily and has given the first crop within a year. The plantation is chiefly designed for manurial trials, the scheme of which is under preparation.

Improvement of Vegetables.—This work has progressed considerably. Both chilli and brinjal crops were a success. Selections have been made. Further tests are being made. It is expected that succeeding years' labour will help us to select provisionally suitable strains of brinjals and chillies.

MODIBAG AGRICULTURAL COLLEGE, POONA.

The establishment and grant of this garden, as mentioned above, have been severely retrenched and hence a part of the experimental work had to be closed down to run the garden on economic lines. In fact, some of the experimental plantations have been cut down. Effort is being made to develop it into a commercial garden.

Alternate bearing of mangoes.—The observations recorded on fruit spurs further show that March and April growth gives inflorescence in the majority of cases.

Citrus Stocks.—As mentioned in the last year's report, root studies of the five important stocks were made in observation boxes. It is only *Jamburi* which shows quick growth of the roots. *Sakhar limboo*, *Mahalung* and *Kagadi Limboo* stand next in order. The growth of shoots of the stocks in the new plot was also recorded and it was found that no other stock could compete with *Jamburi* in this respect. These stocks will be now be budded with Mosambi and further observations on the growth of scion will be made. The scheme relating to the trials of citrus stocks is submitted to the Director of Agriculture and is under consideration.

Mango stocks.—Last year's observations were confirmed. The trees have not yet been topworked.

Mango-budding.—Further trials on the budding of mango show that the season from the middle of June to the end of September is the best for setting the mango buds. It is essential that there should be no rains for a couple of days after the budding operation is done.

Irrigation Experiments in Bananas.—Last year's observations have been confirmed. Trench irrigation is found more profitable than bed system. This work is now finally wound up.

Grape vine seedlings.—Pandhari Sahebi seedlings Nos. 7, 35 and 94 seem to be very promising. A new variety plot will be opened in the Ganeshkhind Botanical Gardens, and a trial to these varieties will be given there on a large scale.

New Introductions.—The navel orange is getting very popular and is in good demand. The grape fruit plants are growing vigorously and are just showing signs of blossom. The Italian lemon appears to be a great success. The plants are bearing profusely. The fruit is liked by people. Further trials to these new varieties will be given in the villages.

ADVISORY WORK.

The Horticulturist to Government, Bombay Presidency, Poona, took active part in the Pandharpur and Betegaon Shows. He held five Horticultural Classes very successfully at Bordi, Haveri, Khed Shivapur, Bombay (Sir Ratan Tata Industrial Home) and Poona (District Agricultural Overseer's Class). The training given to the District Agricultural Overseers was very much appreciated by them. Besides this, Horticultural Demonstrations were given at Ratnagiri and Borivli. As a result of the Horticultural Class held at Haveri a nursery named the "Karnatak Nursery" has sprung up.

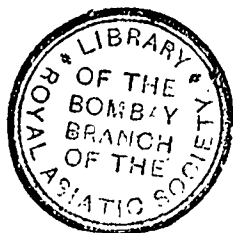
It is important to note here that the efforts of the Department to register Fruit Nurseries in the Presidency with a view to standardise fruit stocks and to effect other similar improvements, have met with a great success. Number of nurserymen are willing to cooperate with the Department in this useful work.

G. S. CHEEMA,

Horticulturist to Government,
Bombay Presidency, Poona.

*Programme of Work under the Horticulturist to Government,
Poona, for the Year 1933-34.*

- (1) Lemon and Jambul juice preservation.
- (2) Export of mango to Europe.
- (3) The Economics of Cashew cultivation.
- (4) Improvement in the system of Marketing.
- (5) Remodelling of the Ganeshkhind Botanical Gardens.
- (6) Manurial observations on Fruit trees.
- (7) Alternate bearing of mango.
- (8) The testing of Guava, Pomegranate, Grape and Fig selections.
- (9) Mango and Citrus stock experiments.
- (10) Improvement of Brinjal and Chilli.
- (11) Introduction of new fruits, such as Grape fruit, Navel orange, Strawberry, Italian lemon in the Deccan.
- (12) Nursery improvements such as, budding of mango, Guava and Jambul stocks.
- (13) Registration of Nurseries in the Presidency.
- (14) Cold Storage studies.



APPENDIX P.

SUMMARY OF WORK DONE UNDER THE INSPECTOR OF AGRICULTURAL
SCHOOLS, BOMBAY PRESIDENCY, MANJRI FARM, FOR THE
YEAR 1932-33.

Staff.—During the year under report, there was no change in the staff, which consists of the officer and one clerk. I held charge of the Office of the Inspector of Agricultural Schools, Bombay Presidency, throughout the year.

Change of Head-quarters.—As a measure of retrenchment, Manjri Farm Experimental work was temporarily closed from 1st July 1933 and the whole staff was absorbed at the new Sugarcane Research Station at Padegaon. The buildings on Manjri Farm remained unoccupied since then. So, in order to make the best use of these buildings, some offices were shifted from Poona to Manjri Farm and this was one of them. From 1st November 1932, our office has been transferred to Manjri Farm from the Agricultural College, Poona, as per G. R., R. D., No. 9444/28, dated the 22nd September 1932. The staff also has been provided with quarters there.

Nature of work.—The nature of my work is generally four-fold viz., advisory, inspecting, examining and corresponding. With regard to the first kind, I had to offer my timely advice to the men concerned with the Vernacular Agricultural Schools and the Agricultural Bias Classes, in connection with the agriculture and its allied subjects and methods of teaching. On several occasions I had also to offer my advice to the teachers concerned how to make the subject of agriculture popular in rural areas, how to maintain discipline in the classes and how to work in harmony and cultivate the spirit of co-operation among the staff. Wherever I went, I dwelt on the importance of agricultural education and discussed with the Educational Officers and School Board Chairman the subject of opening new Agricultural Bias Classes. Regarding the second kind of duty, I had to inspect the Vernacular Agricultural Schools, all Agricultural Bias Classes in the Bombay Presidency, and those High Schools and other educational institutions where the subject of agriculture has been introduced. In the course of inspection, I used to ask the teachers to give some lessons and was thus able to point out their weak points. Besides, model lessons were given on different subjects showing some simple experiments which made the scientific lessons easier and more interesting. The third was the examination work of these two kinds of schools, which I managed with the assistance of the farm and the district staff as co-examiners in the case of the Vernacular Agricultural Schools and as main examiners in the case of the Agricultural Bias Classes. In addition to these, I had to examine the boys of the Government Rural Training School at Loni and to set papers for the Vernacular Final Examination with the Agricultural course on technical subjects in each division. The last but not the least was the correspondence work. The office work has been immensely increased.

One clerk is not sufficient to cope with this heavy work. However, I had to carry on everything sometimes both myself and my clerk sitting late at night. In this respect I had to correspond with almost all Officers of the Agricultural Department in each division, with the Local Bodies—Administrative Officers, Chairmen, District School Boards and the Presidents of the District Local Boards, with the Accountant General, Bombay, with the Educational Inspectors, Senior Assistant Deputy Educational Inspectors, Director of Public Instruction, with the Public Works Department Officers in all divisions in general and those of Poona in particular, and with private bodies in the Presidency Proper including Indian States.

Vernacular Agricultural Schools.—In order to carry out the recommendations of the Royal Commission on Agriculture of 1926, four out of the six Vernacular Agricultural Schools have been already closed. So, during the year under report there were only two Vernacular Agricultural Schools, one at Devihosur and the other at Dhulia. Both of them have become very popular. This sort of vocational education has been highly appreciated by the agriculturists; because many of the students turned out by these schools, are doing excellent work on private farms in their respective villages, helping very much their fellow-cultivators. Hence there is a great demand for agricultural education of this type everywhere. It is gratifying to note that some efforts are being made by private institutions to meet this increasing demand of agricultural education. The Shikshan Prasarak Mandal at Rajapur in the Ratnagiri District is continuing to do useful work in this connection by teaching agriculture in addition to the subjects usually taught in High Schools. The head master Mr. Kulkarni is very keen on introducing agriculture in High Schools. Similarly Mr. Bhise, the Principal of the Gokhale Education Society High School at Bordi, District Thana, has introduced an agricultural course in his High School. In both the High Schools this subject has become very popular and boys of all castes and creeds are taking keen interest and working on plots with great zeal. In both these High Schools, the agricultural education has become self-supporting. So, it is time now for other schools to try similar experiments and make secondary education more useful. More than half a dozen of the head masters of High Schools in the Karnatak have agreed to take steps to introduce agriculture in their schools, as a result of my discussion with them.

The Vocational School at Ankleshwar in Broach District has been doing excellent work under the able guidance of the present headmaster. In addition to the vocational and pre-vocational course, some arrangements have been made to train the teachers in agriculture, both theoretically and practically, along with other subjects. Necessary help was given to the teacher in charge of the agricultural section. In short, this institution has become very popular in the eyes of the public in Gujarat. Such institutions are worth encouraging in other districts also. Yes, the institutions manned and managed by the Christian Societies at Manmad, in Nasik District and at Vadala in

Ahmednagar District are doing most satisfactory work by imparting agricultural education to the sons of the poor cultivators of the backward communities. Timely advice and proper help were made available to these institutions also.

Curriculum.—The curriculum of the Vernacular Agricultural Schools was not changed, though more attention was now being paid towards field practicals and by-industries such as carpentry, smithy, weaving and rope-making. Now most of the students attending these schools are those who have passed their Vernacular Final Examination with or without agricultural course. Hence it seems desirable to make some changes in the curriculum of such schools, by dropping out some subjects such as reading, writing, arithmetic, sanitation, civics etc., and by utilising the same time in some by-industries which are of paying concern. By doing so, we should be introducing a new scheme of earning while learning.

The work of different agricultural schools.—The S. M. K. Agricultural School at Devihosur is one of the Vernacular Agricultural Schools, doing excellent work. 19 Years have passed since the opening of this school. During this period 251 students have been trained. Rao Bahadur C. P. Shetti of Devihosur is taking keen and special interest in this school. It is due to him that the school has been best managed. Mr. Chaugule, the present Headmaster is working hard and sincerely to make this school still more popular in the eyes of the public. Arrangements were made here to give some useful lessons with the aid of the Magic Lantern slides. Mr. G. S. Muragod, the Engine Driver, was found very useful in this connection. It is creditable that he has prepared some useful slides at the cost of his own expenses for the use of the school. So, he is a great helping hand to the headmaster in managing the school very efficiently. The work in by-industries is much advanced here. Besides, this school is more specially noted as many of the past students are doing very good work on their own farms. I noted with satisfaction that the boys had made better progress during the year under report as they were provided with some text books on agriculture.

Vernacular Agricultural School at Dhulia.—This is the only school in the whole of Maharashtra, which is imparting the vocational training in agriculture. This school has completed its tenth year and it was continued to be managed by one graduate assistant under the local supervision of Mr. Ranasingh, the Chairman of the Local School Committee. 20 applications were received during the year and only 10 boys were admitted with the reduced scholarship of Rs. 5 per month. The strength of the school is 31 out of whom 15 are in the first year and 16 are in the second year. The number of the past students up till now is 118. The employment charts* of the past students of this school as well as that of the above school are attached herewith for the ready reference of the readers.

* Employment Charts, accompaniment marked as "A".

Inspection and examination.—I visited each school twice in the year under report. All possible suggestions were made at the time of the inspection and I had to conduct the Annual Examination of these schools personally with the assistants of Mr. N. N. Desai, the Farm Superintendent, Jalgaon, in the case of the Vernacular Agricultural School at Dhulia and with Mr. Mutalik Desai, District Agricultural Overseer, Dharwar, in the case of the Vernacular Agricultural School at Devihosur. The results of the Annual Examination of these two schools are as noted below :—

“ B ”

Statement showing the Results of the Annual Examinations conducted with the help of the District Staff.

Name of the School.	Number of the boys appeared.			Number of the boys passed.			Re- marks.
	I Year.	II Year.	Teachers	I Year.	II Year.	Teachers	
1	2	3	4	5	6	7	8
Devihosur	.. 12	16	Nil.	10	14	Nil.	
Dhulia	.. 15	16	Nil.	13	15	Nil.	
Total	.. 27	32	Nil.	23	29	Nil.	

Both schools have done very well. But it may be reiterated that the degree of success is more or less depending upon the sincerity, efficiency and tactfulness of the headmasters.

During the year under report, the schools came to be known as likely to be closed. So, the public had no time to think of making the best use of these schools. So, the following statement shows the number of applications received and the number of boys admitted :—

“ C ”

Statement showing the detailed information regarding the admission to the Boys in the Vernacular Agricultural Schools.

Serial No.	Name of the School.	Number of applications received.	Number of boys called for interview.	Number of boys selected.	Number of boys to whom scholarships are awarded.	Number of boys admitted without scholarships.	Number of boys likely to be admitted.	Remarks.
1	2	3	4	5	6	7	8	9
1	Dhulia	.. 20	11	10	..	..	6	
2	Devihosur	.. 52	20	15	15	..	3*	*3 more boys will be admitted if they come without scholarships.
Total	..	72	31	25	15	..	9	

Past students of the Vernacular Agricultural Schools.—Past students of the Vernacular Agricultural Schools are spread all over the Presidency and many of them are doing very effective work on their own farms in their villages. The following statement of the past students shows the distribution of past students in each district :—

“ D ”

Statement showing the Number of Past students of different Vernacular Agricultural Schools, distributed in different districts.

Serial No.	District.	Loni.	Devi-hosur.	Dhulia.	Godhra.	Surat.	Jambul.
1	2	3	4	5	6	7	8
1	Dharwar	..	94	..	..	..	..
2	Belgaum	20	62	..	..	..	..
3	Bijapur	..	25	..	..	..	..
4	Karwar	..	22	..	..	..	..
5	Mysore State	..	3	..	..	..	..
6	Poona	47	..	..	..	..	..
7	Satara	51	..	..	..	..	..
8	Ahmednagar	45	..	..	..	..	..
9	Sholapur	25	..	..	..	..	..
10	Nasik	36	..	20	..	..	..
11	East Khandesh	..	..	57	..	..	..
12	West Khandesh	82	..	28	..	..	..
13	Thana	..	..	..	..	..	30
14	Ratnagiri	11	..	..	..	..	15
15	Kolaba	..	..	..	..	..	23
16	States in Maharastra	35	..	12	..	..	..
17	Central Provinces	15	..	..	..	..	..
18	Surat	..	..	..	*	34	..
19	Godhra	..	..	..	*	..	..
20	Kaira	..	..	..	*	4	..
21	Broach	..	..	..	..	2	..
22	Ahmedabad	..	..	..	..	4	..
						*44	
	Total ..	367	206	117	..	88	97

* Information not received.

Yes, they are seen to be in each district and they know the importance of agricultural improvements. In order to bring these men in close contact with the Agricultural Officers and the Taluka Development Associations, some branch associations of these past students were attempted to be formed. So, some boys were collected at Bijapur, Bailhongal and Gokak. The rules and regulations were brought to their notice. They were advised as to how to get on in their profession and were asked to do some public work at no extra cost in their own villages by introducing these agricultural improvements, which can be taken up by any body. In this connection they were explained in details the nature of propaganda work, they were required to do. So, it is gratifying to note that all students have agreed to do some propaganda work according to the directions of the District Agricultural Overseers or the Presidents of the Taluka Development Associations. The success of the work and the probable difficulties can be studied next year.

Some of the past students whom I met in my tours at Bordi in the Thana District, at Jaljalkarki in the Karwar District, at Salotagi, Jumnal and Kakandiki in the Bijapur District, at Devihosur, Arishinagodi, Ibrahimpur and Hansbhavi in the Dharwar District and at Hudli, Ahamatti, Adibatti, Sunadholi, Mamadapur and Mugutkhan Hubli in the Belgaum District are doing most satisfactory work and have become most popular among the cultivators.

Agricultural Bias Classes.—The Agricultural Bias Classes are quite different from the Vernacular Agricultural Schools. The former are the pre-vocational schools where agriculture and its allied subjects are taught in order to prepare the boys for the manual work and to emphasize the dignity of labour. But on the other hand the Vernacular Agricultural Schools are the vocational ones, where the same subjects are taught by laying more stress on practical work in order that they may take up the work of agriculture straight away after their course is over.

The Agricultural Bias Classes are attached to the three higher standards in full grade primary schools at suitable agricultural villages. The following is the list of the Agricultural Bias Classes in the Bombay Presidency proper, which supplies all the information about these classes :—

“ F ”

List of the Agricultural Bias Classes in the Bombay Presidency.

Serial No.	Name of District.	Names of Schools.	Total in each District.
<i>Karnatak-Southern Division.</i>			
1	Dharwar ..	(1) *Hulkoti, (2) Hosritti, (3) Hansbhavi, (4) *Tirlapur, (5) *Motebin-nur, (6) Borstal School.	6
2	Belgaum ..	(1) *Kougnolli, (2) Kagwad, (3) *Konnur, (4) *Kuligod, (5) *Parashwad, (6) *Kittur, (7) *Hudli, (8) *Bedakihal, (9) *Chachadi, (10) Manolli, (11) *Nyasargi, (12) *Nandgad, (13) *Mugutkhan-Hubli, (14) ‡Sattigeri, (15) ‡Muragod, (16) ‡Belavadi.	16
3	Bijapur ..	(1) *Almel, (2) *Bhatgunaki, (3) *Kakhandaki, (4) *Kaladagi, (5) Neelgund, (6) ‡ Itagi, (7) ‡Mashibinal.	7
4	Karwar ..	(1) Chendiye, (2) *Tergaon	2
<i>Central Division.</i>			
5	Sholapur ..	(1) Mohol, (2) Degaon, (3) Muhud-Budruk, (4) Kari, (5) Laul, (6) Kumbhari, (7) Tembhurni, (8) †Akalkot.	8

* Rural clubs have been started at these places.

† These schools are private ones managed by Mission and other societies.

‡ A. B. classes are to be attached to these schools.

" E "—concl'd.

Serial No.	Name of District.	Names of Schools.	Total in each District.
<i>Central Division—contd.</i>			
6	Satara	(1) Peth, (2) *Kale, (3) *Bhuinj, (4) *Bhilavadi.	4
7	Poona	(1) *Narayangaon, (2) *Wadgaon-Nimbalkar, (3) Veer, (4) †Baramati.	4
8	Ahmednagar	(1) *Deolali, (2) *Jeur, (3) *Kanhur, (4) *Dhandarphal, (5) Supe, (6) Nimgaon-Jali, (7) Sarole-Kasare, (8) †Vadala, (9) †Punatamba.	9
9	West-Khandesh	(1) *Kusumba, (2) Mohida	2
10	East Khandesh	(1) *Vaghali, (2) *Asoda, (3) *Thor-gavan, (4) *Bhalod, (5) Mhaswad, (6) Jamner.	6
<i>Konkan-Bombay Division.</i>			
11	Nasik	(1) *Ozar, (2) *Dabhadi, (3) *Sukena, (4) Nampur, (5) *Vavi, (6) Ranwad, (7) Kazi-Sangvi.	7
12	Thana	(1) Bordi, (2) †Bordi High School ..	2
13	Ratnagiri	(1) Naringre, (2) Kasarda, (3) †Rajapur.	3
<i>Gujarat Division.</i>			
14	Surat	(1) Vaghachippa, (2) Godsamba, (3) Vapi.	3
15	Broach	(1) *Diva, (2) *Sarbhana, (3) †Ankleshwar.	3
16	Kaira	(1) Uttarsanda, (2) Lamwell	2
17	Ahmedabad	(1) *Ashalali, (2) Detroj	2
18	Godhra	(1) Dohod, (2) *Rustumpura, (3) *Derol, (4) Kankanpur.	4

* Rural clubs have been started at these places.

† These schools are private ones managed by Mission and other societies.

From the above list, it is seen that there are 90 Agricultural Bias Classes in the Bombay Presidency Proper. Those which are marked with (†) sign are separately explained in the foot-note how they are managed.

It is an admitted fact that the Agricultural Bias Classes have become very popular in rural areas and there is thus a great demand for the same. But the present financial stringency has come in the way of rapid multiplication of these classes. However, 3 new Agricultural Bias Classes have been opened, two in the Nasik District and one in the Sholapur District. Owing to unavoidable local troubles, some Agricultural Bias Classes have been shifted to other suitable places. I regret to note that some non-cultivating people are not in favour of these schools being prejudiced against agriculture and agriculturists. However, efforts are being made

to make these classes universally popular and highly efficient as shown below :—

(1) By starting Rural Clubs in those places, where the Agricultural Bias Classes are introduced. The aims and objects of the Rural clubs are to popularise agricultural improvements through its members, who are the past students. The Agricultural Teacher of the place is to be the Chairman of the Rural Club. In about 40 villages in the Bombay Presidency the Rural Clubs of the past students of the Agricultural Bias Classes have been started. (Please see the foot-note of the statement marked as "E".) These clubs have become very popular and it is likely they will produce some good results by next year.

(2) By supplying up-to-date leaflets on agriculture in different vernaculars to all the Agricultural Bias Classes in different divisions.

(3) By writing suitable text books in Agriculture to supply the needs of the Agricultural Bias Classes in Karnatak.

(4) By giving details and the particulars of the agricultural headings in the syllabus of the Agricultural Bias Classes. Many of the Teachers have not followed the syllabus simply because they were ignorant of the details of the syllabus. These details are not only useful for the Agricultural Teachers in teaching according to the prescribed syllabus, but also they will be useful for the Supervisors and other Inspecting Officers to inspect their work.

(5) By issuing a circular on by-industries. This contains definite information to be followed by the Agricultural Teacher for each boy in each class. This has been highly appreciated by all.

(6) By suggesting a list of experiments to be followed in the Agricultural Bias Classes in teaching Nature-study and Soil-study. These experiments, which do not cost any money, will be most useful in making the technical and scientific subjects easier and more interesting to the boys.

(7) By instructing the Agricultural Teachers how best they should grow crops on both individual and common plots and by explaining the aims and objects of observation in different standards on the spot during the inspection.

(8) By sending a standard time table to all the Agricultural Bias Classes in the Bombay Presidency. There was no similarity in the time tables of the Agricultural Bias Classes in one district even. So, on comparing the time tables of all the Agricultural Bias Classes in the Bombay Presidency, including Sind, it was found out that there was much variation in each other. Hence action was taken to do the needful.

(9) By arranging to receive monthly progress reports of all the Agricultural Bias Classes to compare the progress of one school with that of the other in each month and to study the monthly progress of each school in comparison with that of the previous month of the same school. Thus I was able to find out many irregularities. Accordingly the Administrative Officers were informed to mend the matters.

(10) By training agricultural teachers according to our test on the spot when I met them in tour. Many of them did not know what to do in the class and what to do in the field. So, by giving some useful and needed information on the spot in connection with agriculture and its allied subjects, I expect now uniform results in all schools.

(11) By holding meetings in different places to emphasize the importance of agriculture in general and that the agricultural education in particular. Many people had wrong impressions about the Agricultural Bias Classes. So, efforts were made to put the matters right by means of these friendly talks.

(12) By enlisting the sympathies of officers in the Revenue and Educational Departments towards these classes.

(13) By making a proposal to all Chairmen of the District School Boards to entrust all the Agricultural Bias Classes of each district to one of the best Supervisors. It is gratifying to note that this kind of arrangement has been already made in 8 districts and it has become easier in those districts to make progress.

(14) By discussing with the Supervisors and Administrative Officers on the conditions of the Agricultural Bias Classes.

(15) By supplying the copies of the new syllabus to all the Agricultural Bias Classes and by informing the Administrative Officers the places and the firms, where the agricultural books, agricultural seeds, agricultural and science apparatus are available for sale.

Thus an immense improvement is seen in the Agricultural Bias Classes during the year under report. With limited time and Travelling Allowance grant at my disposal, I was able to visit and inspect all the Agricultural Bias Classes in the Bombay Presidency once. But I feel it is necessary to visit these classes twice in a year to raise the general standard of these classes.

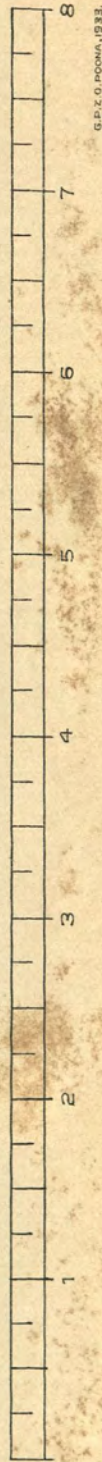
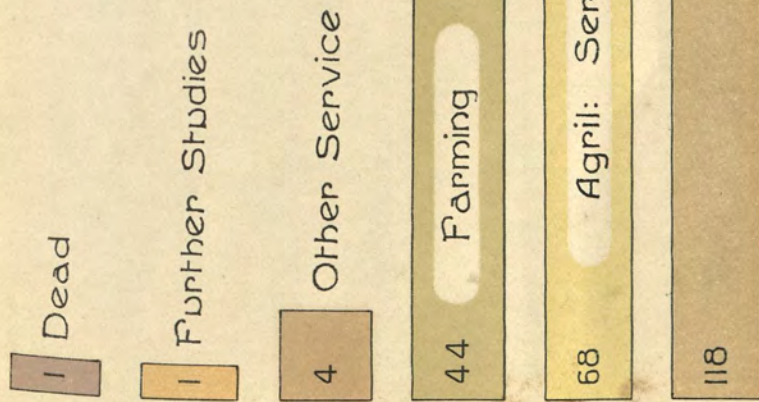
Training of these teachers.—On account of financial stringency this work was not at all taken up during the year under report. But the necessity of training more teachers in agriculture is strongly felt everywhere. The present Government Rural Training School at Loni is doing its bit very well. But the training given here in agriculture is very little. So, the teachers turned out by this institution are not found very useful in managing the Agricultural Bias Classes. However, many are appointed as agricultural assistants in the Agricultural Bias Classes under the Agricultural Teachers. But with the proper guidance of the Agricultural Teachers, they are turned out very useful assistants. As there is no institution for the present to train the teachers for the Agricultural Bias Classes in the Maharastra, where there is a great demand for the rapid multiplication of the Agricultural Bias Classes, the present Government Rural Training School may be extended so as to have a two or three year's course in Agriculture and other subjects to turn out proper teachers for the Agricultural Bias Classes. There is a great need of such Government Rural Training Schools in other divisions also.

Text Books.—There is a general complaint about the paucity of text books for the Agricultural Bias Classes. In this connection some people in the Maharastra have written books on Agriculture in Marathi, which are recommended as text books for the Agricultural Bias Classes. But in the Southern Division and the Northern Division, there are no suitable books at all, which can be used as text books by the teachers of the Agricultural Bias Classes. So, I had to write four books on agriculture in Kanarese, which have been approved by the Text Book Committee. As regards books in Gujarati, one Agricultural Bias Class Teacher at Derol in the Panch Mahals District has been attempting to fill up the gap and he has been given proper hints and instructions. Out of the existing books on agriculture in general, some books have been sent to the Deputy Director of Agriculture, Gujarat, Surat, for his opinion whether they can be used as text books, in the absence of good and proper ones. However, the Educational Department is requested to make some special arrangements in furnishing the text books on agriculture in different vernaculars for all the Agricultural Bias Classes.

Manjri Farm,
15th July 1933.

V. C. PAVATE,
Inspector of Agricultural Schools,
Bombay Presidency, Manjri Farm.

STATISTICS OF PAST STUDENTS EMPLOYMENT, DHULIA SCHOOL. 1"=20 STUDENTS



"A"

STATISTICS OF PAST STUDENTS EMPLOYMENT, DEVIHOSUR SCHOOL.

1"=30 STUDENTS

Other Service

13

Agricultural Service

15

Not known

86

Farming

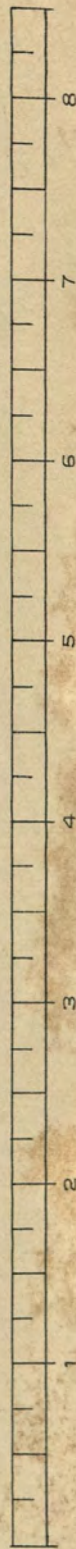
137

Passed

206

Appeared for Examination

251



*Programme of Work under the Inspector of Agricultural Schools,
Bombay Presidency, Manjri Farm, for the year 1933-34.*

- (1) Continuing the inspection the Agricultural Bias Classes in giving all possible advice in managing these pre-vocational schools more efficiently and at the same time with immense popularity.
- (2) Inspecting and Examining the Vernacular Agricultural Schools, imparting necessary instructions in coaching the students on most economical lines.
- (3) Making necessary changes in the syllabus of the Vernacular Agricultural Schools, giving much predominance to the field-practicals and by-industries.
- (4) Pushing up the movement of spreading the Rural Clubs in all the Agricultural Bias Classes and by observing the work done by each club.
- (5) Offering advice to the Local Bodies and the officers of the Educational Department to start more Agricultural Bias Classes.
- (6) Requesting the Managers of the Private High Schools to introduce agriculture as a subject along with other subjects.
- (7) Making the branch Associations of the past students of the Vernacular Agricultural Schools in each district in order to spread the agricultural improvements through them.
- (8) Offering technical advice to the private institutions which have started agricultural course.
- (9) Making the Agricultural Bias Classes to work according to the syllabus and the standard Time Table.
- (10) Writing some books on Agricultural Arithmetic and Nature-study.

Manjri Farm,
15th July 1933.

V. C. PAVATE,
Inspector of Agricultural Schools,
Bombay Presidency, Manjri Farm.

APPENDIX Q.

SUMMARY OF WORK DONE UNDER THE PROFESSOR OF
AGRICULTURAL ECONOMICS FOR THE YEAR 1932-33.(1) *Administration.*

Rao Bahadur P. C. Patil worked as Professor of Agricultural Economics till 21st October 1932 when he retired after putting in 27 years' service in the Department. In addition, he acted as Principal, College of Agriculture, Poona, from 30th April 1932 till the time of his retirement. After working as a Deputy Director of Agriculture for several years, he joined the College staff in June 1925 to work in the newly-created post of the Professor of Agricultural Economics. As a first incumbent of the post he took considerable pains to build up material in agricultural economics with remarkable success. He contributed several articles and bulletins and two of his bulletins embodying the research done by this section have been recently published as Departmental publications.

I continued to be on study leave in England combined with leave on average pay till 21st October 1932 when I took charge of the office of the Professor of Agricultural Economics. Mr. K. M. Shah, B.Ag. continued to work as Demonstrator in Agricultural Economics till 17th May 1933 when he was transferred to Samarkha, via Anand, Kaira District as Investigator in Agricultural Economics. Mr. T. B. Pawar, B.Ag. worked as Investigator in Agricultural Economics at Malsiras in the Sholapur District, till 31st March 1933 when he went on deputation to the Imperial Council of Agricultural Research to work as Provincial Officer in charge Economics Enquiry, Bombay, Poona. Mr. M. B. Ghatge, B.Ag., who was District Agricultural Overseer, Nasik, has been transferred under me and working as Demonstrator in Agricultural Economics from 13th June 1933.

(2) *Teaching.*

Agricultural Economics is taught as a compulsory course to the B.Ag. students who select Advanced Agricultural Economics as their optional subject. The compulsory course in agricultural economics goes in the group "General Agriculture" and the result in Agricultural economics cannot, therefore, be given separately. Eleven students including five old students who had taken agricultural economics as their special subject appeared for the B.Ag. examination and nine passed.

A six weeks' post-graduate class in cost accounting was conducted by the section at Malsiras in July last. There was a rush for admission to this class and 30 graduates, 21 from Bombay Presidency, including Sind, 6 from Madras Presidency and 1 each from Baroda, Kolhapur and Phaltan States attended. An examination was held at the close of the class and certificates were given to those who passed.

I delivered lectures on co-operation and the agricultural crisis and fall in prices to the Co-operative Societies' Secretary's classes held at Malsiras and Jalgaon in the early part of this year.

(3) *Research.*

The work of costing 25 farms at and near Malsiras in the Sholapur District was started in the year 1930-31 and closed at the end of May 1933. A mass of information on the economics of farm management in this tract has been collected during these three years and I am at present busily engaged in the collation and interpretation of data for publication as a departmental bulletin.

Three villages, Malsiras, Islampur and Kanher were selected. Islampur is about 6 miles distant from Malsiras and Kanher is adjacent to Islampur. Malsiras and part of Islampur are under command of the Nira Right Bank Canal, but people seem to be very slow to utilize the canal water, particularly at Islampur. A large part of irrigated cultivation at Islampur and all the irrigated farming at Kanher depends on wells. Possession of some *bagayat* land irrigated by wells is a common feature and part of the holdings of the 25 farmers studied was irrigated.

Areas and Holdings.—In 1930-31 the net cropped area of the 25 farms was 507 acres and 33 gunthas while the gross cropped area was 542 acres and 3 gunthas. The index of cropping was thus 107. The gross cropped area per farm came to 21 acres and 27 gunthas. In 1931-32 these 25 farmers cropped 596 acres and 1 gunthā on the cultivated area of 569 acres and 26 gunthas, thus giving an index of cropping as 105. The per farm gross cropped area in this year came to 23 acres and 34 gunthas. The average number of fragments per holding was 6·3.

Employment of Labour.—The following statement indicates the number of days' work per man, per woman and per bullock of the Malsiras, Islampur and Kanher farms separately and of the 25 farms of these places jointly*.

	5 Malsiras Farms.		10 Islampur Farms.		10 Kanher Farms.		All 25 Farms.	
	1930-31	1931-32	1930-31	1931-32	1930-31	1931-32	1930-31	1931-32
Number of days' work put in by one man.	121	149	108	99	146	146	123	125
Number of days' work put in by one woman.	54	67	43	39	63	85	55	59
Number of days' work put in by one bullock.	143	135	135	121	128	127	134	129

* The figures in the table include the labour obtained in exchange but excludes hired labour.

Percentages of home labour, hired labour and labour obtained in exchange of the total labour utilized on the farms studied were as follows :—

	1930-31.				1931-32.			
	Home Labour.	Hired labour.	Ex-change labour.	Total	Home labour.	Hired labour	Ex-change labour.	Total.
<i>Malsiras Farms—</i>								
Man labour ..	64.7	24.2	11.1	100.0	72.6	19.0	8.4	100.0
Woman labour ..	44.2	55.8	..	100.0	37.8	62.2	..	100.0
Bullock labour ..	66.4	5.5	28.1	100.0	72.4	6.4	21.2	100.0
<i>Islampur Farms—</i>								
Man labour ..	66.9	13.8	19.3	100.0	72.8	6.9	20.3	100.0
Woman labour ..	61.3	35.7	3.0	100.0	71.8	27.3	0.9	100.0
Bullock labour ..	64.7	0.7	34.6	100.0	67.5	..	32.5	100.0
<i>Kanher Farms—</i>								
Man labour ..	64.3	12.4	23.3	100.0	78.2	6.9	14.9	100.0
Woman labour ..	53.8	45.3	0.9	100.0	65.7	33.2	1.1	100.0
Bullock labour ..	66.8	..	33.2	100.0	71.9	..	28.1	100.0
<i>All Farms—</i>								
Man labour ..	65.4	15.5	19.1	100.0	74.5	10.2	15.3	100.0
Woman labour ..	54.1	44.4	1.5	100.0	60.7	38.5	0.8	100.0
Bullock labour ..	65.9	1.5	32.6	100.0	70.4	1.4	28.4	100.0

Income.—The farm business incomes* obtained by the farmers were as follows :—

	Per Farm	
	1930-31.	1931-32.
	Rs. a. p.	Rs. a. p.
Malsiras Farms	88 6 4	72 5 4
Islampur Farms	36 5 6	93 8 1
Kanher Farms	21 14 7	127 13 4
All Farms	40 15 8	117 7 6

* Farm business income is taken to mean farm receipts *minus* out of pocket expenses. The out of pocket expenses include charges for hired labour, bullock labour cost, seed, manure, rent on leased land, depreciation on equipment, irrigation charges and land assessments and local fund cess.

The farm business incomes per man-day of farm work were as below :--

			Farm business income per man-day of farm work*	
			1930-31	1931-32.
			Rs. a. p.	Rs. a. p.
Malsiras Farms	..	..	0 5 9	0 8 4
Islampur Farms	..	..	0 2 3	0 6 4
Kanher Farms	..	..	0 1 5	0 7 5
All Farms	..	..	0 2 6	0 7 3

The lower incomes in 1930-31 were due to lower yields and an enormous fall in prices. The following figures indicate the extent of fall in prices of *jowar*, *bajri* and cotton at Malsiras between 1929 and 1931 :--

		Jowar.	Bajri.	Cotton.
November 1929				
(Seers per rupee)	.. ..	9.00	8.56	4.75
November 1931				
(Seers per rupee)	.. ..	30.80	28.80	8.00
P. C. fall from November 1929 to November 1931.		248 per cent.	236 per cent.	69 per cent.

Better incomes obtained in 1931-32 were due to better yields and a slight recovery in prices of some commodities. The returns obtained compare favourably with wages in other occupations but agriculture does not provide work throughout the year. On the farms studied one man worked for only about 4 months in the year.

The results of analysis have so far been extremely interesting, illuminating and of practical utility and I am continuing the work of analysis and interpretation.

From June 1933, the farm management research work of this section has been shifted to Kaira District to study the economics of mixed farming with livestock raising. Three villages, two near Anand and one near Borsad have been selected and 30 farms covering an area of 140 acres and 23 gunthas have been taken up for intensive investigation. Considering the nature of work and the type of farming, it may not be possible to manage all the 30 farms within the capacity of my small staff, but attempts will be made to retain this number.

* "Man day" is taken to mean the amount of farm work put in by one man in one day. Woman labour expended for farm work is converted into "man days" at the rate of 2 woman units equal to one man day. In calculating the returns per man day in the statement, hired labour is excluded as it was separately paid for, but exchange labour is included.

Publications.

- PATIL, P. C., SHIRNAME, T. G.,
PAWAR, T. B., & SHAH, K. M. Preliminary Studies of Important
Crops in the Bombay Deccan
(Bulletin 168 of the Department of
Agriculture, Bombay).
- PATIL, P. C., with PAWAR, T. B. Principles and Practice of Farm Cost-
ing with Farm Studies (Special
Publication of the Department of
Agriculture, Bombay).
- PAWAR, T. B. .. Evils of Land Parcelling (Poona
Agricultural College Magazine, Vol.
XXIV, No. 3).
- SHAH, K. M. .. Grading of Agricultural Products in
Bombay Market (Poona Agricul-
tural College Magazine, Vol. XXIV,
No. 4).
- SHIRNAME, T. G. .. Marketing of Some Agricultural
Products exported from Bombay to
the United Kingdom. (Submitted
for publication as a Departmental
Bulletin).

College of Agriculture,
Poona :
July 15th, 1933.

T. G. SHIRNAME,
Professor of Agricultural Economics.

*Programme of work under the Professor of Agricultural
Economics, Poona, during the year 1933-34.*

(1) Collation and interpretation of and writing up the report on the data collected at and near Malsiras during the years 1929-30 to 1932-33. An attempt will be made to find out a new method of analysing farm management data. An analysis of physical quantities is probably more important than that of monetary values, at least under Indian conditions and I am trying to see if I can get results of better utility by using the method of variation and correlation.

(2) Study of economics of mixed farming with livestock raising on the 30 farms selected in the Kaira District. In consultation with the Deputy Director of Agriculture, Gujarat, I am examining the possibility of securing voluntary help in conducting an economic survey of some selected villages in the tract under study. The survey material, if obtained, would form an important and valuable supplement to the intensive enquiries that are being made on the 30 farms.

(3) Teaching agricultural economics and farm management to students of the College.

T. G. SHIRNAME,

College of Agriculture,
Poona :

July 15th, 1933.

Professor of Agricultural Economics.

**List of Agricultural Bulletins published by the Department
of Agriculture and kept for Sale at the Government
Book Depot, Bombay.**

No.	Year.	Subject.	Price.	
			Rs.	a. p.
32	1908	Locusts in India, by H. M. Lefroy, Imperial Entomologist, Pusa.	0	8 0
33	1909	Cultivation of Broach Cotton in Dharwar, by M. L. Kulkarni, Divisional Inspector of Agriculture, S. D. ...	0	4 0
34	1909	Night-soil—A Valuable Manure, by G. K. Kelkar, Assistant Professor of Agriculture, Agricultural College, Poona ...	0	4 0
36	1910	First Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency, by W. Burns, Economic Botanist ...	0	14 0
37	1910	An Examination of the Seed-Supply of the Broach District, by G. D. Mehta ...	0	4 0
39	1910	The Salt Lands of the Nira Valley, by Harold H. Mann, Principal, Agricultural College, Poona, and V. A. Tambane, Laboratory Assistant, Agricultural College, Poona ...	0	5 0
40	1911	The Cultivation of Guavas near Poona, Dharwar and Limbgaon .	0	12 0
41	1911	Groundnuts in the Bombay Deccan ...	0	4 0
43	1911	An Examination of the Seed-Supply of the Broach District, Part II ...	0	5 0
44	1911	Preliminary Study of the Red Rot of Sugarcane in the Bombay Presidency ...	0	8 0
45	1911	Second Year's Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency ...	0	14 0
46	1911	Seed Selections Series I, Broach Cotton ...	0	8 0
47	1911	San Hemp ...	0	4 0
48	1911	Poona Furnace ...	0	7 0
49	1911	An Examination of the Seed-Supply of the Ahmednagar District, Part I ...	0	5 0
50	1912	An Examination of the Seed-Supply of the Ahmednagar District, Part II ...	0	3 0
51	1912	Third Year's Experiments in the Treatment of Grape-Vine Mildew ...	0	3 0
52	1912	Muscovado Sugar Machinery and its scope for Gul Manufacture in India ...	0	8 0
53	1912	A Method of improving the Quality of Cotton Seed ...	0	7 0
55	1913	An Examination of the Seed-Supply of the Poona District ...	0	3 0
57	1913	Improvement of the Indigenous Plough of Western India ...	0	12 0
59	1914	Common Salt and its use as Manure in the Konkan Division ...	0	3 0
62	1914	The Value of Castration of Deccan Bullocks ...	0	3 0
63	1914	Substitutes for Rab ...	0	3 0
64	1914	Alkali or Kalar Experiments and Completion Report of Daulat- pur Reclamation Station in Sind ...	0	14 0
65	1914	A List of Diseases of Economic Plants occurring in the Bombay Presidency ...	0	4 0
67	1914	An Examination of the Seed-Supply of the Sholapur District ...	0	3 0
69	1915	The Rice Stem Borer in the Konkan ...	0	3 6
70	1915	Improvement of Cotton in the Bombay Presidency (except Sind).	0	3 6
74	1915	Well Waters from the Trap Area of Western India ...	0	6 0

No.	Year.	Subject.	Price.	
			Rs.	a. p.
79	1916	The Cultivation of Guavas in Gujarat ...	0	5 6
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